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APRIL
1952

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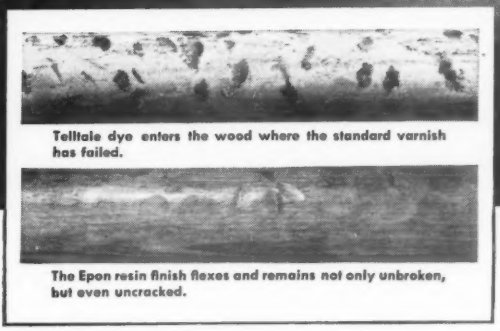

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PAINT and VARNISH Production

Formerly PAINT and VARNISH PRODUCTION MANAGER
(Established in 1910 as The Paint and Varnish Record)

VOL. 42 APRIL, 1952 NO. 4

NEXT ISSUE

Synthetic rubber latex paints will be featured in the May issue. This article will cover in detail the following subjects: types of latices used; formulation with emphasis on thickening agents, emulsifying agents, and other additives; mechanism of film formation; preparation; pigmentation; and properties of various latices.

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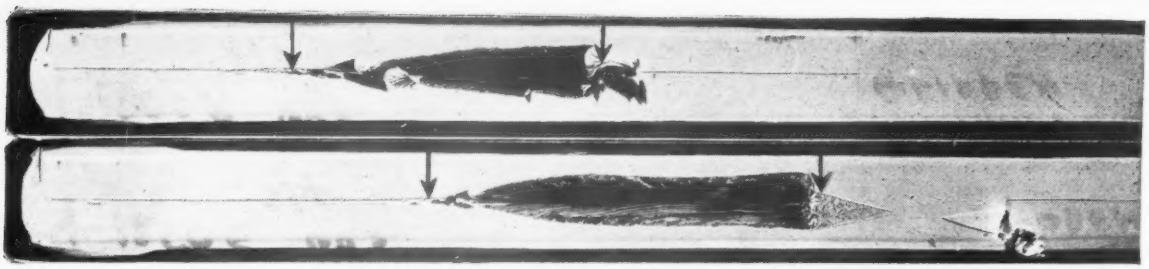

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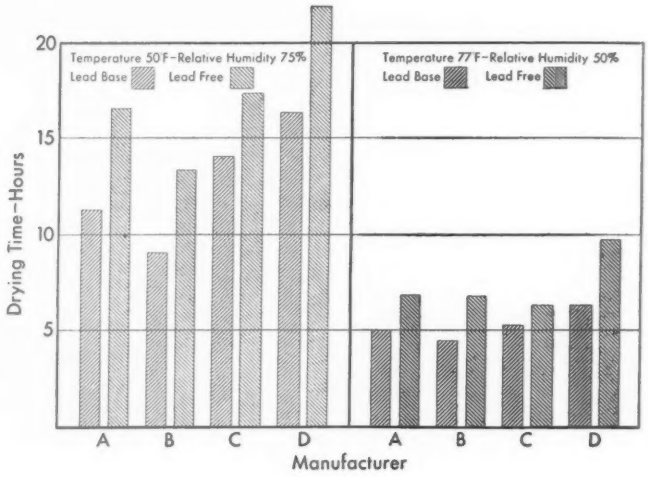

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"Lead" base and lead-free house paints, all mixed the same day, were applied to test panels to a thickness of three mils. Three paint manufacturers, (A, B and C) each supplied a set of two brand-name paints—one "lead" base and one lead-free—for the tests. The fourth set (D) was made to Federal specifications: TT-P-102 ("lead" base), and TT-P-103 (lead-free). Two separate tests were made under different atmospheric conditions (warm and dry; cool and humid).

●

These are valid reasons for the use of lead pigment in *your* paint formulations . . . all valid sales arguments. For detailed information on the most effective use of white lead in your paints—write for "White Lead in Mixed Pigment House Paints" and "White Lead Technical Bulletin #1." *Lead Industries Association, 420 Lexington Avenue, New York 17, N. Y.*

All government restrictions on the end uses of lead have been lifted.

1615

Domestic Tung Production

THE 1950 Census revealed that the growing of tung nuts in the United States has increased nearly 70 times in volume as compared with 10 years earlier. The 1949 crop, according to the Census, exceeded 146 million pounds compared with 2,321,000 from the 1939 crop. The 1944 crop was 62,693,000 pounds.

Tung trees in four southern states numbered 12,313,362 in 1950. Of these 2,108,892 were not yet of bearing age.

Tung oil was first shipped from China to the United States in 1869 but the first tung grove, consisting of four acres, was set out in 1913 in Florida. The tung tree is the National tree of China and its oil enabled the Chinese to achieve their high standards in varnishes and in the water-proofing of wood, paper and fabrics. After the oil is removed the resulting paste is used for caulking.

NPA Advised on Black Plate

CONSIDERABLE economic waste is being experienced by the paint industry through the use of black plate for can manufacture, the National Production Authority was told at a recent meeting of the Paint Advisory Committee.

Spokesmen for the Committee said that failure of linings, difficulties in seating plugs and the necessity of spot-welding lids on cans shipped through the mails is causing hardship. The Committee members recommended that NPA take action to remove quota restrictions on the use of 24, 26 and 28 gauge sheet for the manufacture of five-gallon and two-gallon pails because of the improvement in supplies of cold rolled steel; and permit the use of .25 pound tin plate for paint cans and discontinue the requirement that black plate be used in paint cans.

NPA requested that the industry submit a statement of their experiences in using black plate instead of tin plate for oil or oleoresinous paints.

Violations in Wage-Hour Law

ACCORDING to the 1951 annual report of the U.S. Labor Department's Wage and Hour Public Contracts Divisions, 52 percent of the establishments investigated in the paint industry during the past fiscal year were found to have violated the Act's minimum wage, overtime pay or child-labor provisions.

"The 1951 record makes it clear that greater efforts on the part of some members of the paint and varnish industry would pay off in reduced liabilities for back wages owed employees," points out Wm. R. McComb, the Divisions' Administrator. His report shows that a total of $14,836 in back wages was paid to 186 employees, as a result of the Divisions' activities. This sum does not include amounts awarded by courts to employees who exercised their statutory right to sue for back pay and liquidated damages.

"Although most employers know that the amendments raised the minimum wage to 75 cents an hour from 40 cents, the Division found that a sizeable minority of establishments (6 percent of those investigated) had failed to observe this requirement when paying some of their employees" states McComb.

"Even more extensive were overtime pay violations, found in 44 percent of the investigated establishments. Employers should remember that the amended Act continues to require payment of at least time and one-half the employee's regular rate of pay for all hours worked in excess of 40 in the work week, except where the Act specifically provides otherwise. What the amendment did was to define the regular rate to include all remuneration for employment except certain specified payments."

Failure to comply with the Act's child-labor provisions was disclosed in 5 percent of the investigated establishments, McComb noted.

The Administrator wants members of the industry to know that the violations found last year were not representative of the compliance record of all employers whose employees come within the provisions of the Act. The Division's policy is to make investigations where there is reason to believe that violations will probably be found. Moreover, experience demonstrates that the great majority of employers intend to comply with the Act; in most cases, failures are due to misunderstandings about the statutory provisions.

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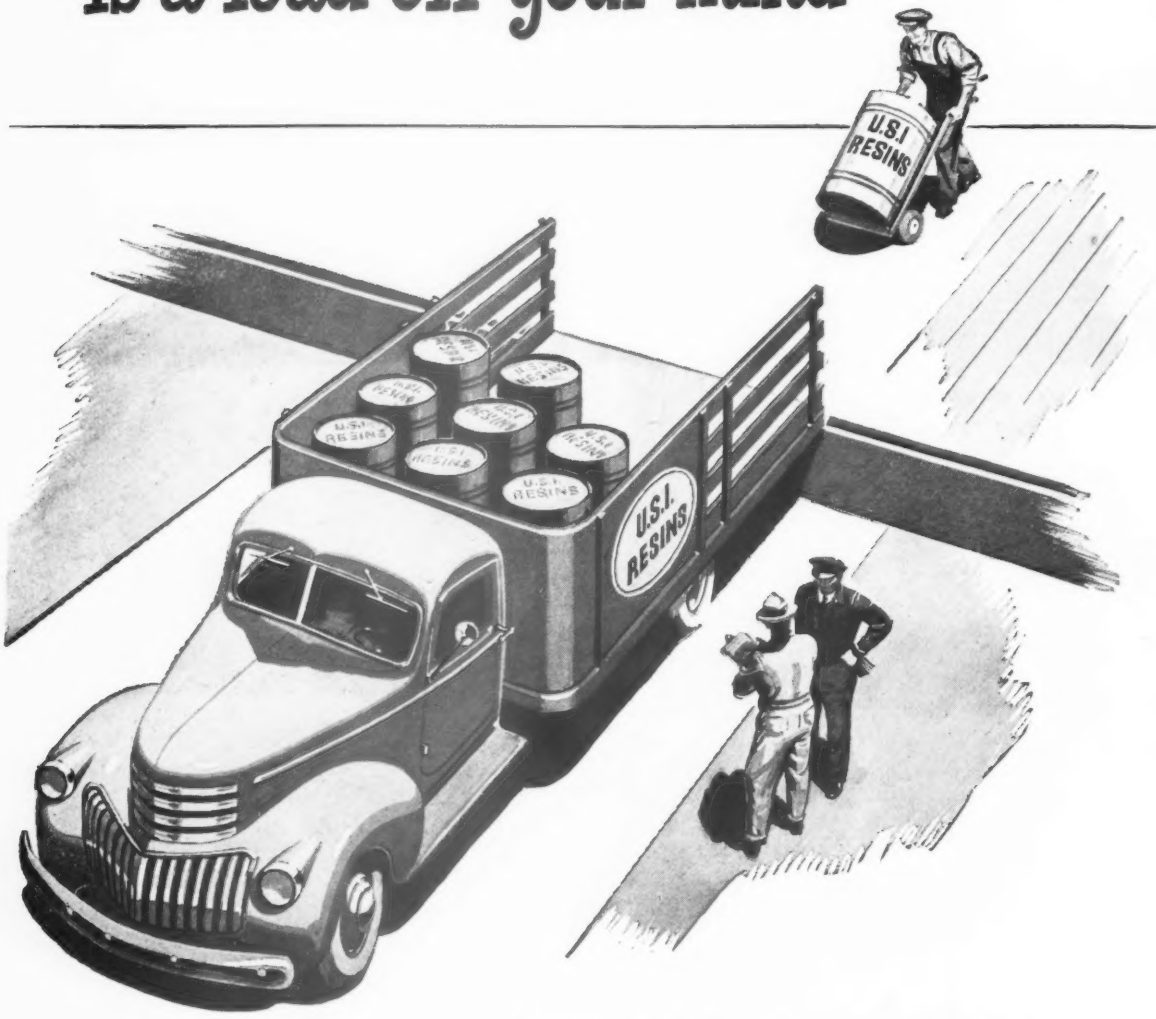

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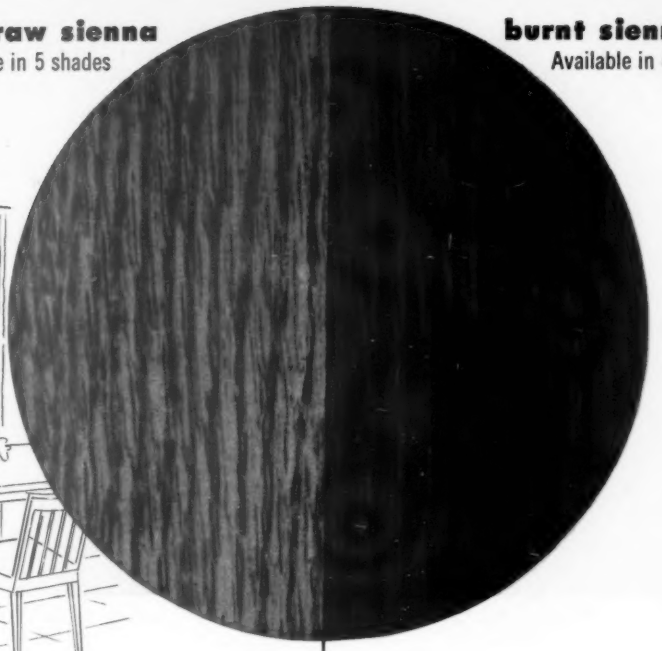

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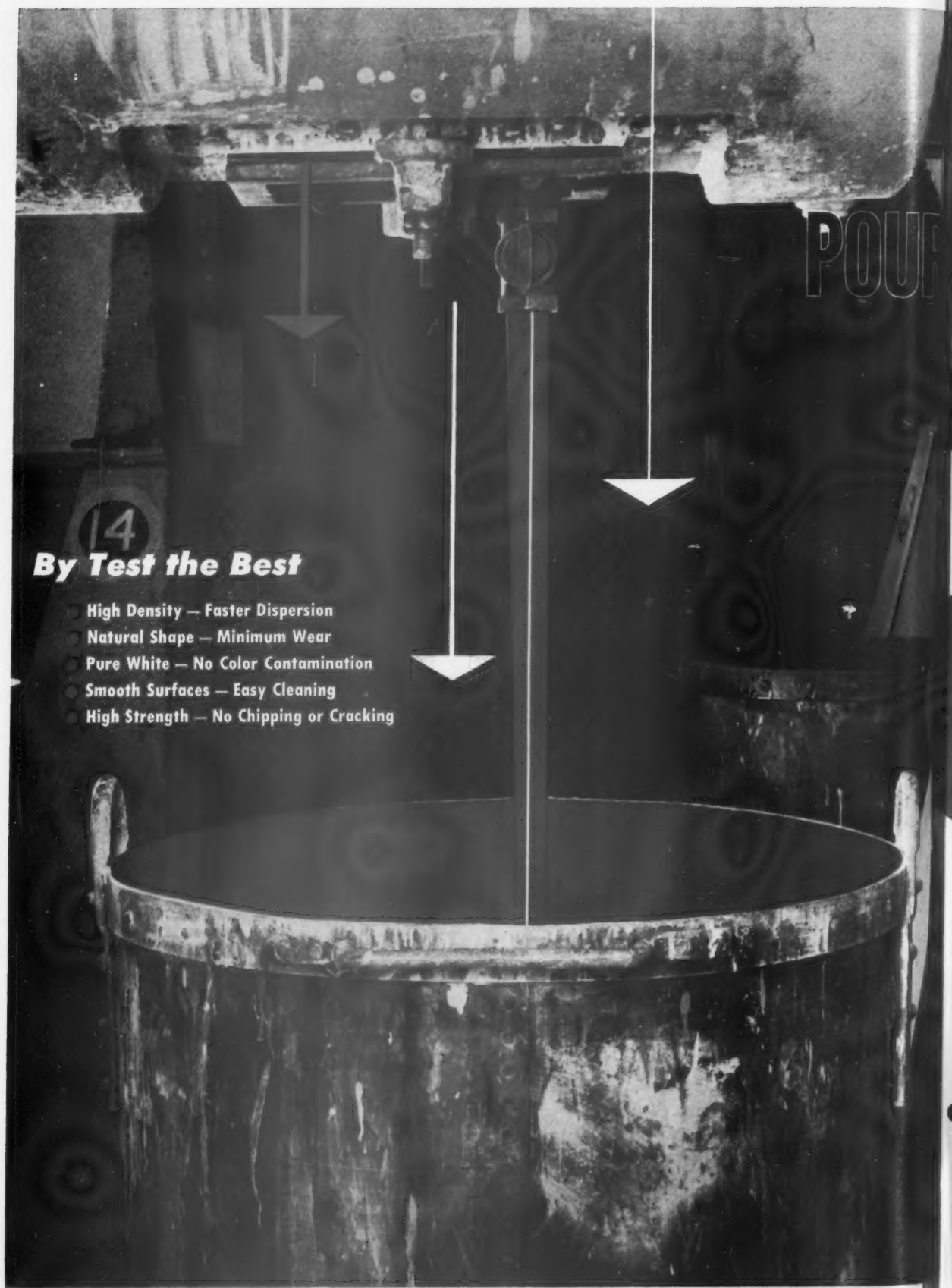
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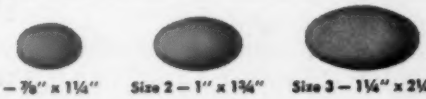

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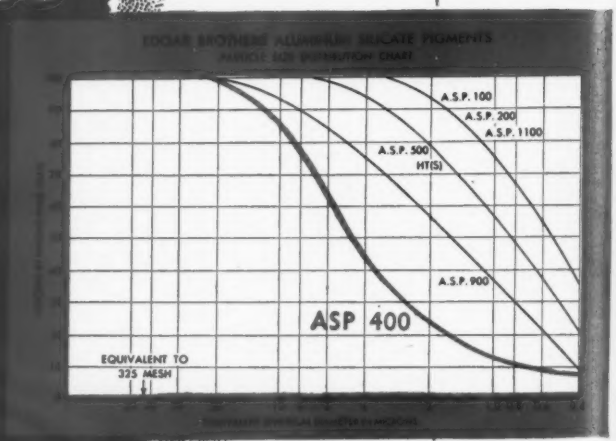

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Amino Resins For Surface Coatings

RELATIONSHIP OF THE CHEMISTRY OF ORGANIC SOLVENT SOLUBLE UREA AND MELAMINE RESINS TO THEIR END USES

By
CHARLES H. PARKER
Monsanto Chemical Co.
Springfield, Mass.

A VERY brief review of the history of the development of amino resins designed for coating uses is in order. Ellis[1] records many of the early attempts to produce ureaformaldehyde resins, all of which left something to be desired when they were applied to the surface coating field. Early in the 1930's, success was finally attained and the first commercial urea resin truly designed for surface coating applications appeared on the market in 1936. Since then rapid strides have been made in development of and applications for this type of resin and production of such types now totals many thousands of tons annually.

In contrast to urea which was an abundant material and very cheap to produce, melamine, prior to the late 1930's was a very rare and expensive chemical and little had been done with it from a resin standpoint. About 1938, a workable process for producing it from a relatively cheap intermediate (dicyandiamide) suddenly dropped its price to very nearly its present level. Rapid studies on its methylol compounds and reaction of these with alcohols led to the development of a butylated melamine resin which made its commercial appearance in 1940. The surface coating industry of today absorbs many thousands of tons of resins of this type, many of the applications having come into prominence since the end of World War II.

It is perhaps significant that the development of amino resins followed somewhat closely the development of the alkyd resins, which created a major revolution in the coatings industry just prior to, during and immediately following World War II. The introduction of urea and melamine resins was very timely, since they tend to complement the alkyds and to show their best properties in such combinations. It is conceivable that, had the amino resins been exploited *before* the alkyds were pretty well-known vehicles, their good properties might have been either overlooked or their rapid development very sharply retarded. As it stands now, the industrial enamel formulator has, in the amino resins, a tool for providing rapid heat conversion in his alkyd vehicles and, in the alkyd resin, a very efficient, relatively low cost, reactive plasticizer for his amino vehicle.

Chemistry of Organic-Solvent Soluble Resins

IN the discussion of the fundamental chemistry involved in amino resins for coating uses, one should first consider the three primary reactants — the amino body, the aldehyde and the alcohol — separately.

Figure 1 shows, in the simplest form, the combination of the three reactants.

AMINO BODIES

Generally speaking, and with regard to possible exceptions, urea, melamine and the alkyl or aryl substituted diamino triazines (guanamines) are the most adaptable

This paper was presented as a part of the Symposium on Urea, Melamine, and Related Resins at the 119th National Meeting of the American Chemical Society in Boston, Mass. on April 4, 1951.

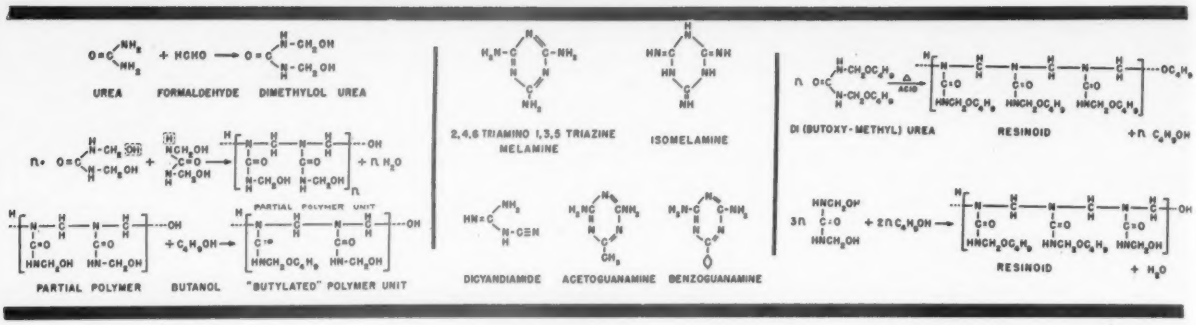


FIGURE 1 FIGURE 2 FIGURE 3

amino bodies for yielding the desired organic-solvent soluble resinous product.

Dicyandiamide, guanidine and the biguanides, ammeline and thioammeline all will react satisfactorily with formaldehyde to make methylol compounds, but when these are, in turn, reacted with primary alcohols under the conditions generally required to yield the alkoxy product, they have, in general, failed to yield sufficient alkoxy content for organic-solvent solubility.

Figure 2 — Melamine and isomelamine are tautomers and by resonance of the double bonds can assume either structure or a combination of both structures. When reacted with formaldehyde in excess of three mols per mol of melamine, it is highly probable that the imino structure is assumed, because it is possible to prepare hexamethylol melamine in isolated form, and a structure containing more than one methylol group on a nitrogen atom is generally considered to be unstable.[8] The diamino triazines shown would theoretically take up four mols of formaldehyde and probably also would assume an imino type of structure in such case. The diamino triazines form on reaction of the corresponding nitrile, with dicyandiamide, under suitable reaction conditions.

ALDEHYDE BODIES

Formaldehyde appears to be the most adaptable aldehyde in producing an acceptable resin. Acetaldehyde, for example, forms ethylol derivatives with the amino body but, on introduction of an alcohol, experience indicates that good film properties generally are not obtained. Cure is slow and color retention on heating is poor by comparison with the corresponding alkoxy-methyl compound. Unsaturated aldehydes (e.g., crotonaldehyde) behave very much like acetaldehyde.[13]

Mixed aldehydes (e.g., formaldehyde and acetaldehyde) indicate that very little of the higher aldehyde is combined, because the higher one can usually be removed almost completely by distillation from the resinoid body. It is probable that in such a mixture, formaldehyde, because it forms methylene glycol in the presence of water, is very much more reactive with the amino body.

Dialdehydes, such as glyoxal, generally tend rather quickly to form a ring type of compound with urea, rather than the desired polymeric material.

Generally speaking, then, formaldehyde is the most adaptable aldehyde.

ALCOHOL BODY

If it be assumed that formaldehyde is the most adaptable aldehyde, and that urea and melamine are the most adaptable nitrogen bodies, the methylol compounds of either body are capable of reacting with many monohydric alcohols. The most commonly used alcohols are the primary, aliphatic monohydric alcohols containing from three to five carbon atoms in the chain. Those longer in chain length tend to etherify so slowly that an undesirably high resinification of the methylol compound results and useful products are rarely obtained on direct etherification with such alcohols. Alcohols with less than three carbon atoms in the chain have such great water solubility that recovery of the alcohol becomes a rather expensive proposition. Further, these alcohols impair the compatibility of the resultant resin with other coating materials to a very considerable extent and lower the hydrocarbon tolerance. Secondary alcohols in this range of chain length are not too satisfactory because they are almost too slow in reaction rate to prevent a rather high degree of resinification.

This leaves normal butanol, normal propanol, isobutanol and, possibly, secondary butanol as the most adaptable alcohols for primary etherification of the methylol body. These alcohols form azeotropic mixtures containing high proportions of water and facilitate its removal without too expensive recovery operations. They also confer adequate hydrocarbon tolerance on the resultant resin solution. It is possible also, as will be shown later, to use the very high boiling alcohols such as octyl and lauryl by making direct etherification products with the lower alcohols and replacing part or most of these with the high boiling ones by a transetherification reaction. Such technique improves compatibility and aliphatic hydrocarbon tolerance but retards curing properties to a considerable extent.

Having reviewed individually the basic materials from which the organic-solvent soluble amino resins are made, a consideration of some of the factors which control the design of the final product's properties is in order.

Formaldehyde

ALMOST without regard to which nitrogen body one might select, probably the greatest single influence is the formaldehyde content. With normal butanol as the alcohol, when the formaldehyde ratio is at the higher practical level for the number of active hydrogen

atoms available to make methylol compounds, viscosity is generally low, compatibility and hydrocarbon solvent tolerance very good, cure properties somewhat slow, and solution stability is at the maximum. When the ratio is at the lower practical levels (still with normal butanol as the alcohol), the exact reverse in these properties can be expected. Perhaps the next most influential factor is the hydrogen ion concentration in the preparation of both the intermediate methylol compound and the etherified product. This constantly changes during the reaction and must be closely controlled to obtain a proper balance between resinification and etherification reactions and to assure a uniform product. [1, 12]

Alcohols

AT a constant formaldehyde ratio and closely controlled pH value the amount of and type of alcohol used profoundly influences viscosity, compatibility, solvent tolerance and cure. Short chain alcohols (e.g., less than three carbon atoms in chain) generally yield fast cure, low viscosity, poor compatibility, poor hydrocarbon tolerance and, very frequently, lead to "popping" troubles in enamel films. Long chain alcohols (e.g., more than five carbon atoms) generally will reverse these properties except for viscosity. A high content of etherified methylol bodies yields low viscosity, slow cure, excellent compatibility and hydrocarbon tolerance, while a low content of the *same* ether (e.g., normal butanol) will exactly reverse these properties.[10, 12] It is the resin manufacturer's desire to balance these factors to yield the most satisfactory combination of properties in the final product.

Manufacture

IN practice, the manufacture of urea-formaldehyde resins generally starts either from an aqueous syrup or from a solid "dimethylol urea". The latter may be obtained by spray, drum or other method of drying an alkaline condensed urea-formaldehyde reaction product. This intermediate is then dispersed in acidified alcohol and is heated to effect etherification and further resinification, both of which reactions liberate water. In the aqueous syrup method, a primary con-

FIGURE 4

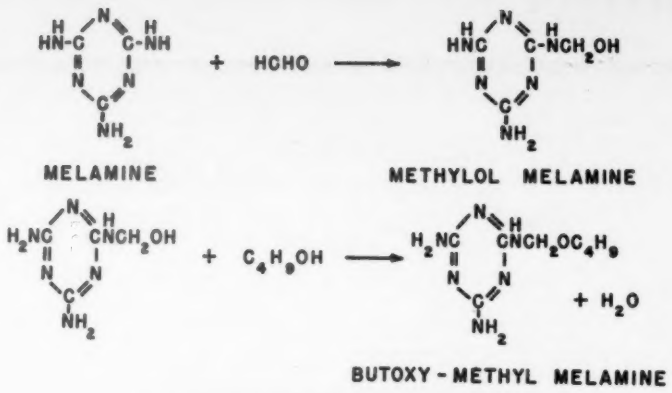


FIGURE 5

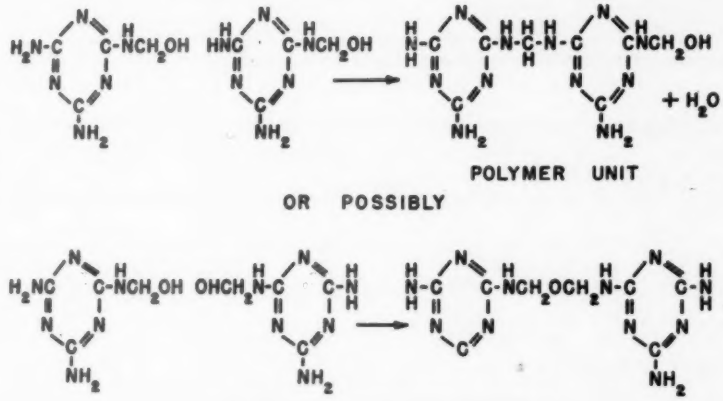


FIGURE 6

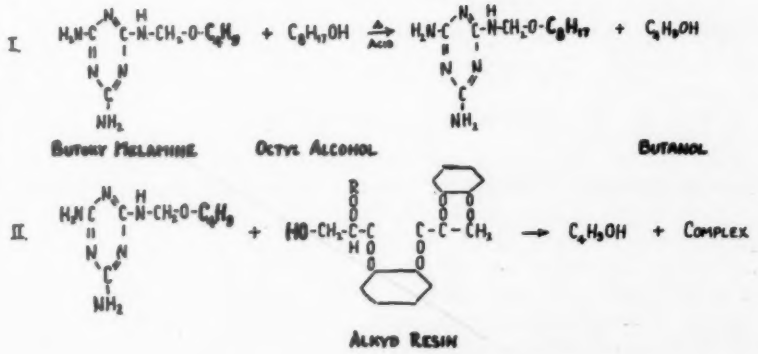
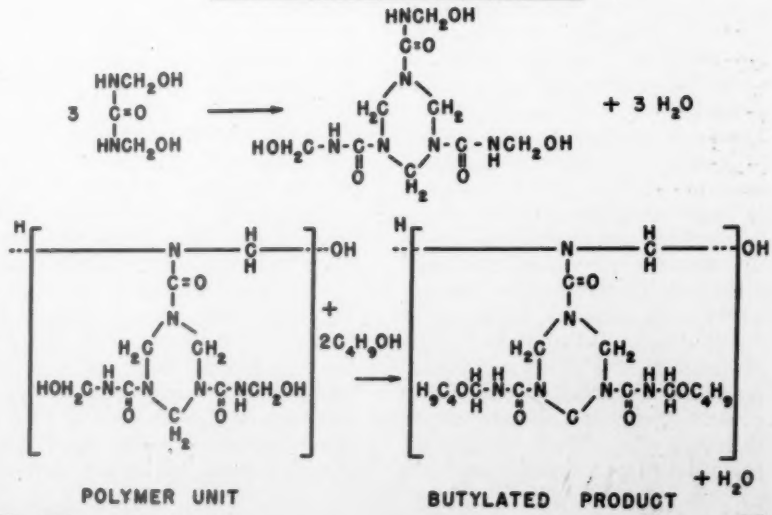


FIGURE 7



TYPE I	- HIGH VISCOSITY, FAST CURE, LIMITED COMPATIBILITY, GENERAL PURPOSE USE.
TYPE II	- LOW VISCOSITY, SLOWER CURE, MUCH BETTER COMPATIBILITY, BETTER GLOSS.
TYPE III	- VERY HIGH MINERAL SPIRITS TOLERANCE AND EXCELLENT COMPATIBILITY, VERY LOW VISCOSITY, RATHER SLOW CURE AND HIGH GLOSS.
TYPE IV	- ESSENTIALLY SAME AS TYPE III, BUT PERMITS WIDE LATITUDE IN SOLVENT SELECTION.

FIGURE 8

TYPE I	- VERY FAST CURING, HIGH COLOR RETENTION, LIMITED COMPATIBILITY AND ALIPHATIC HYDROCARBON TOLERANCE, GOOD ALKALI RESISTANCE.
TYPE II	- SLOWER CURING, EXCELLENT COMPATIBILITY, PARTICULARLY WITH MINERAL SPIRITS SOLUBLE ALKYDS, VERY HIGH MINERAL SPIRITS TOLERANCE, HIGH GLOSS, FAIR ALKALI RESISTANCE.
TYPE III	- GOOD CURING PROPERTIES, EXCELLENT COMPATIBILITY, VERY HIGH GLOSS, BEST ALKALI RESISTANCE.
TYPE IV	- ESSENTIALLY SAME AS TYPE III, BUT OFFERS VERY WIDE LATITUDE IN ACTIVE SOLVENT SELECTION.

FIGURE 9

densate of urea and formaldehyde is first made which may then be used as is or partially dehydrated by vacuum distillation. In either case, the alcohol (acidified at some point) and the syrup are heated to the boil as in the case of the "dried" intermediate. To remove both the water of reaction and any "mechanical" water is the next step. This may be done by straight distillation and continuous replacement of distillate with dry butanol or by refluxing the distillate over a "separator" apparatus, in which the water layer of the condensed azeotrope mixture is continuously withdrawn, and the alcohol layer continuously returned to the sphere of reaction. When the reaction product has a sufficiently low water content (generally the solution at this end point should contain not more than 1 percent of water), the operation may be considered to be substantially complete.[2, 3, 4, 5, 6, 7]

In practice, the manufacture of melamine-formaldehyde resins for coating uses does not always involve starting from a water soluble intermediate or partially resinified product. The nitrogen body, the formaldehyde (in water solution), and the alcohol may be charged simultaneously and heated to the reflux point, maintaining careful control of hydrogen ion concentration during the critical heating period. On reaching the reflux point, the water is removed in much the same manner as described previously until the prescribed water content is reached. Control of the resin's final properties depends on the formaldehyde ratio, the amount and type of alcohol and the degree of acidity during the heat-up. The proper balance between resinification and etherification is important in assuring a uniform product. Acids used to control hydrogen-ion concentration are usually selected from such acids as phthalic, phosphoric, formic and others of like strength.

Curing Mechanisms

THE mechanism of cure of these solvent-soluble types of amino resins is still somewhat obscure and is a subject of further study. Realizing that this is a highly controversial subject, a few thoughts on it in very idealized form are offered. Cure of the melamine resins, *by themselves*, is actually quite sluggish, but a *very* small amount of acid is sufficient to rectify this in normal baking ranges (200-400°F). Since the urea resins normally finish up at a higher degree of acidity, their cure, by themselves, is not as sluggish.

In their solution form, the commercial urea coating resins may contain from about 0.5 to 1.0 mols of combined butanol per mol of urea. Elementary analysis for carbon, hydrogen, nitrogen and oxygen on resinoids precipitated from their solutions by dilution with large volumes of non-solvent hydrocarbon thinners show this quite accurately.[9] This corresponds, roughly, to an average value of about 2 butoxy groups for three urea residues. Melamine resins generally will show, on similar treatment, about three butoxy groups for two melamine residues where the original mol ratio of formaldehyde to melamine was about six to one.

Figures 1 and 3 — It is important to realize that the full di (butoxymethyl) urea, for example, would not be satisfactory as a coating component. To render it useful, it would have to be partly cured (e.g., some of the combined butanol would have to be split out), in mass, prior to application in a film. For good coating and curing properties, it is preferable, therefore, to prepare the methylol compound first and partially condense this prior to or during reaction with the alcohol. Under the reaction conditions previously described, it is probable that reaction of methylol groups with adjacent groups is the first occurrence (even in the presence of alcohol) and it is only when this approaches an equilibrium point that reaction of remaining

methylol groups with the alcohol becomes rapid. The chain length of the alcohol is probably another important factor, however, and a comparison of methyl alcohol with normal butyl very logically could be expected to show a greater proportion of methoxy-methyl groups versus butoxy-methyl groups in the respective resin solutions, if optimum reaction conditions for each alcohol applied in both cases. To prepare the full diether requires special reaction conditions considered outside the scope of this subject matter.

In the commercial melamine resin solutions the following fundamental components are probably present in some equilibrium mixture:

Figures 4 and 5 — The drawings are very much simplified and only one reactive point is shown for each reaction. Since there may be somewhere between 3 and 6 methylol groups on each melamine molecule and all of these compounds will form at some stage in the reaction, it is difficult to visualize a structural relationship.

Curing with Alkyds

CURING in the presence of alkyd resins probably provides an additional mechanism which is interesting to contemplate and which would provide a new resinous body right in the film. Consider this from a standpoint of a transetherification mechanism in a very simplified form.[10, 12] Although no attempt at proof of this possible reaction is offered at this time, it does serve to explain some observed facts. The very highly simplified diagram of the alkyd resin is intended to represent a combination of two molecules of glycerine, two of phthalic anhydride, one of fatty acid and leaving one free hydroxyl group. This corresponds, roughly, to about a 40% oil content glyceryl phthalate resin.

Figure 6 — Alkyd resins high in hydroxyl content may be very susceptible to this probable reaction with amino resins and this may be one of the reasons why short oil alkyds carrying a fair excess of hydroxyl over the theoretical amount are more compatible in the baked films, yielding high gloss and toughness, versus the same type of alkyd resin without such excess hydroxyl which frequently yields poor gloss and poor toughness when

BUTYLATED MELAMINE RESINS

	Description	Alkyd Compat.	Cure Prop.	Sn'l Visc.	Sn'l Stab'y	Sn'l Gloss	Alk. Resis.	Min.Spts. Tolerance	Flexi-Bility
TYPE I	(A)Low CH_2O	Short-Med.	v.fast	high	fair	good	good	low	good
	(B) " "	short-med.	v.fast	low	v.good	good	good	med.	good
	(C)Low-Med CH_2O	short long	fast	low	exc.	v.good	good	high	v.good
TYPE II	(A)High CH_2O	med-long	good	v.low	exc.	exc.	fair-good	ext.high	exc.
TYPE III	(A)Med. CH_2O	short-long	v.good	low	good	exc.	exc.	low	v.good
TYPE IV	(A)Med. CH_2O	short-long	v.good	#	#	exc.	exc.	v.low	v.good
	(B)Med. CH_2O	short-long	v.good	med.	good	exc.	exc.	v.low	v.good

#Depends on solvent choise. Viscosity of enamel is, of course, very high with weak solvent or low with true solvent. Stability of enamel is poor with weak solvent but good with true solvent.

BUTYLATED UREA RESINS

	Description	Alkyd Compat.	Cure Prop.	Sn'l Visc.	Sn'l Stab'y	Sn'l Gloss	Alk. Resis.	Min.Spts. Tolerance	Flexi-Bility
TYPE I	Low CH_2O High Visc.	short-med.	fast	very high	fair	good	fair	low	good
TYPE II	High CH_2O Low Visc.	short-med.long	med.	low	v.good	v.good	fair	med.	good
TYPE III	High CH_2O V.Low Visc.	short-long	slow	v.low	exc.	v.good	poor	high	exc.
TYPE IV	"	short-long	slow	#	#	v.good	poor	low	exc.

#Same comment as for Type IV (A) melamine resin applies here.

FIGURE 10

baked with the same amino resin. The mild acidity of the alkyd is still sufficient to allow the curing reactions previously described to proceed.[10, 12]

As to the structure of the cured resins, several theories have been postulated for the curing of these methylol compounds. One such theory, recently proposed by *Marvel and his associates*, also may be applied to urea-formaldehyde coating resins. This theory proposes that one end of the urea molecule behaves as a primary amine in contact with formaldehyde. Intermediate molecules, consisting of six-membered rings, then form, corresponding to a cyclic trimer, leaving terminal methylol groups.[9, 11] It seems tenable that if such a structure were assumed (in the intermediate), alkoxy groups would form readily when the alcohol is introduced and the solubilization of the complex body in organic solvents would be assured. Figure 7.

Properties

SINCE it has not yet been possible to attain all of the desirable properties of amino resins in a single product, there are several general types available. One such method of classification of these resins is hereby presented, with the realization that other classification schemes are quite possible. Taking the melamine resins first, the following types[10,12] are found (Figure 8).

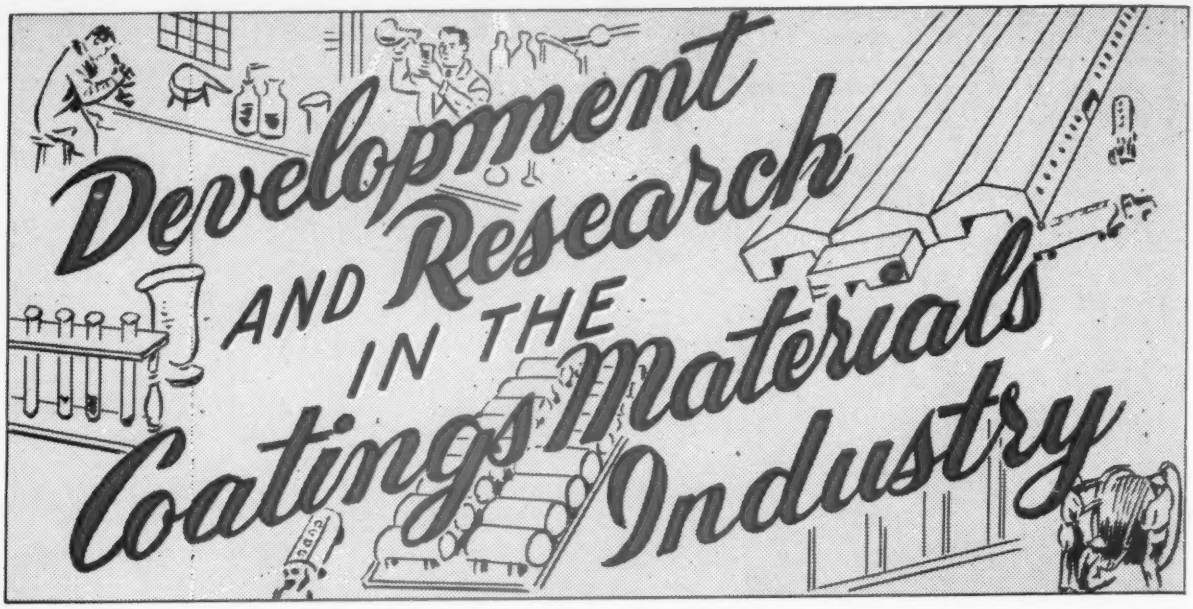
Similarly the commercial urea resins may be grouped as follows (Fig. 9).

It will now be attempted to present in one figure the various types, identified by their major compositional variables, and their expected enamel and film properties, in a very general sense, when combined with alkyd resins.

In figure 10 it has been attempted to present the results of a large number of tests. Therefore, it must be recognized that there will be exceptions in specific cases under special service conditions but, as generalities, the data will hold. Most of the properties were obtained on enamels containing 5 to 50% amino resin solids on the total vehicle solids.[13]

In the column "Alkyd Compatibility", short-oil alkyds were arbitrarily taken as those containing 45% or less of oil, medium as 45 to

(*Turn to Page 61*)



PART V

DEVELOPMENT TECHNIC FOR VARNISH AND VEHICLE FORMULATION

By
HOWARD C. WOODRUFF
Alkyd Products Engineering
General Electric Co.

CONSIDERING vehicle problems as case histories, here is what four typical case histories look like —

Case 1. The Case of the Paper Oil Containers

A container manufacturer produced for a major oil company a cellulose-fibre, cylindrical lubricating oil container. A cellophane disk was inserted in each end so that the color of the oil could be demonstrated by holding the container up to the light.

Our function was to develop and supply an oil-proof-coating for the interior of the containers. Specifications included: — flexibility sufficient to change shapes as the paper container did, formation of a continuous film, self sealing at mechanical joints in container manufacture. Application was by rollers, drying in 20 minutes at 170°F.

Two samples were submitted for test. One was acceptable at once. It consisted of a very short-oil-alkyd pigmented with inerts only. The use of the container resulted in greatly increased sales mostly on the "look-thru" basis. It was later found that lubricant stored in the coated containers had demulsification values considerable better than similar lubricant stored in metal containers.

Case 2. The Case of the Glass Washing Machines

An equipment manufacturing company in collaboration with a soft drink company had developed a machine for washing and sterilizing drinking-glasses. It is a self-contained unit operating on the counters at various metropolitan soda fountains.

This unit is an aluminum casting, containing a horizontal rotating wheel holding the beverage glasses, which are first sprayed with an acid detergent in water at 180°F and later rinsed with pure water at 180°F. The machine is covered with a plexiglass dome, so that all parts of the machine and the operation are visible.

Production of this machine was stopped because although mechanically satisfactory, no supplier could

Editor's Note: This article discusses some of the many commercial and technical considerations entering into vehicle formulation. Mr. Woodruff writes these discussions based on his own varied experiences. The facts and examples he uses do not necessarily represent the practices of any single company.

furnish a coating which would remain white, adhere to the aluminum, withstand the hot-water-detergent spray combined with the various mechanical and thermal shocks.

The finishing system we recommended, which proved satisfactory from the beginning, consists of: first, a primer which reacts with and passivizes the aluminum; next, a barrier coat of low permeability, followed by the white coat containing titanium dioxide in an alkyd-vinyl vehicle. This is topped with two coats of vinyl clear. Application is by spraying.

The original machines using this system are, it is understood, still in use, under conditions which caused failure of all other suppliers' products tested within one week.

Case 3. The Case of the Blocking Aluminum Candy Wrapper

A candy company after setting up equipment for the coating of aluminum foil with green enamel, found that the coated foil, when rolled up and stored frequently blocked so badly that the roll could not be unrolled and used for wrapping candy in their conventional candy machines.

The continuous process for coating the aluminum consisted of unrolling the uncoated foil running through rollers which applied the enamel and passing through a bank of infra red lamps which heated the coating to 220°F. The painted foil was festooned for 20 minutes and then rolled up. The film of enamel was 0.8 to 0.4 mls. thick.

The current problem was to produce an enamel which when applied under these conditions would not block. The coating supplied, consisted of a medium oil-length alkyd containing urea-formaldehyde resin, paraffin wax and lecithin, using as pigments phthalocyanine blue and an organic yellow. As a result of the use of this coating, which was later supplied in various colors, two additional machines of the same design were installed.

Case 4. The Case of the Tropical Bottle Caps

Glass jars for storing and shipping preserved foods were found unserviceable for shipment to the tropics. The paper lining on the metal caps caused the trouble. The wax being used as the coating melted.

The problem then became —

Produce a coating for paper, roller coat application, clear. Bake 170°F., 12 minutes then cool at room temperature. 8 minutes stack without blocking. Must withstand water, vinegar, olive oil indefinitely. Must be non-toxic.

Recommended solution —

18 gallon chinawood-oil and linseed oil varnish, 50% modified phenolic resin, 50% of a 100% phenolic resin, cobalt and manganese driers.

Pathways to Problem Solutions

THESE case histories point out typical results, but by what paths do you arrive at results like these?

The pathways open in improving an existing process without necessarily altering the raw materials involved aim at the evolution of a product more specifically meeting the customer's requirements, or which, in production, will be simpler, faster, and or subject to improved control.

Application to Vehicle Design

Particularly in the process of manufacturing paint grinding vehicles, continuous process research leads to a greater understanding of each step in the various stages of manufacture, and leads to a continuous improvement in control tools, since paint vehicles must conform to many divergent, yet highly specific requirements, such as storage stability in terms of viscosity and dry characteristics, pigment wettability, pigment reactivity, settling, flocculation of pigment. In a market where competition is constantly improving product characteristic, it is highly important that we ourselves continuously improve our techniques for controlling these factors.

Standard vs. Variation—

Development work in this phase assumes the pattern of getting a series of comparative data. You refer your work to a known standard which is agreed on and accepted by the trade as satisfactory for performance. Then, you study and compare each step in a series of altered cooks. Consider the effect of either slower cooking or higher temperature cooking, cooking with and without catalyst, at various agitation speeds, with various pre-bodying effects on the oil, in order to establish a trend.

For example, a conventional varnish was made as the standard in a series of test varnishes. This control varnish was made using a modified phenolic resin in a 22-gallon oil length varnish. Eleven gallons of the oil was chinawood oil, while the other 11 gallons was linseed oil. A second varnish was made using linseed oil but the oil was previously bodied to a Q viscosity. A third varnish was made using linseed oil bodied to a V-W viscosity. A fourth varnish was based on linseed oil bodied to a Z-3 viscosity. All varnishes were tested for drying rate, reactivity with basic pigment, time required for the varnish to reach a #6 grind in a standard pigment formulation, gloss of the final enamel, and viscosity of the final enamel. Results showed that the varnishes with bodied oil were higher in gloss, lower in apparent viscosity, and much shorter in grinding time. The trend indicated that bodying the oil increased the ability of the vehicle to envelop the pigment.

From this trend data, which showed that pre-bodying the oil improves its ability to disperse pigment, we design our new material with characteristics referred to the commercial standard.

Raw-Material Approach

Another pathway that opens up in improving an existing process consists in the use of alternate or new raw material. New raw materials can be used either to:

a. Produce products at lower cost, but equal in performance, or
b. Produce products at similar cost, but having improved performance.

The procedure for determining the suitability of a new raw material depends on: — the establishment of a composition and performance of current commercial products. You set up for control performance data and laboratory runs of standards. Then, state the char-

acteristic desired to be reached by altering the established product.

The standards being established proceed to substitute alternate or newly available raw materials in the preparation of each vehicle of a series of test vehicles. Make the series so that one vehicle change can be spot-lighted at a time, and so that you will always be able to determine trends. Trends of influencing factors on the composition of the final product so as to assure the accuracy of our results by providing sufficient duplicate checks. We then test the control composition and the altered composition. We run the same tests on the altered materials and on the control. We use not one test but a series of tests because a number of various types of tests will give us an average of the effects our changes cause. To be of value, the tests must be comprehensive enough to enable us to predict trends and so designed as to tell us how the product would work out in use by a customer.

Now, having a series of trend data with a variety of new raw materials in an old compositional basis, we also have sufficient data to enable us to predict which new raw material will be satisfactory, and we also have at hand sufficient data to compute and compare costs. Of course, the cost matter is the overall guiding factor.

Now, the next action is to re-evaluate our conclusions, check the cost against the new and desirable quality, and to make up enough material for a customer to work with. You have to find a customer who is willing to take a flier on some test work with you. The customer is usually aware that if a new or desirable product will be available as a result of the work, he will be one of the first to have supplies of the new products when they are commercially available. The customer's test work tells us, and it also tells the customer, the advantages and disadvantages of the material, which we could not see from our own test work or from our laboratory studies.

In referring to Tables I, II and III, you will see a detailed example of how the development operation can be carried out.

The object of the project was to produce a commercially acceptable varnish for use either as a clear or

TABLE I

VARNISH TEST SERIES

Test	Resin	Oil	Oil Length	Cobalt Linoleate (lbs.)	Litharge (lbs.)	Minutes @ 560°F	Final Viscosity 50% N.V.	Final Color	Comments: Characteristics of Film After 18 hrs. Drying.
1	Limed Rosin	China Wood Oil	30	1½	0	5	J-K	14	Tack free, medium hardness. Control a commercial standard.
2	Limed Rosin	Blown Linseed	30	1½	0	20	D	18	Tacky, soft.
3	Limed Rosin	Oiticica Oil	30	1½	0	15	D	17	Tack free, medium hardness.
4	Limed Rosin	Z3 Dehydrated Castor Oil(S-1)	30	1½	0	30	D-E	14	Tacky, film soft.
5	Limed Rosin	Z1 Linseed Oil(S-2)	30	1½	0	30	D	16	Tack free, good film.
6	Limed Rosin	Z3 Dehydrated) Z1 Linseed)	15) 15)	1½	0	30	F	14	Slight tack, soft film.
7	Zinc Resinate	Blown Linseed	30	1½	0	20	D	18	Tacky, soft film.
8	Zinc Resinate	China Wood Oil	30	1½	0	25	E	14	Considerable tack, soft film.
9	Zinc Resinate	Z1 Linseed Oil	30	1½	0	20	F	16	Considerable tack, very soft film.
10	Zinc Resinate	Z3 Dehydrated Castor Oil.	30	1½	0	20	F	12	No tack, good film.

Objectives:

Comparison of available oils with commercially available resinates.

Comparison of calcium and zinc resinates.

In preparing varnishes shown in these tables oil heated with resin to 560°F. Held required time, cooled to 400, drier added and thinner.

S_1 Dehydrated castor oil heat bodied to Z3 viscosity at 570°F.
S_2 Linseed oil heat bodied to Z1 viscosity at 585°F.

TABLE II

VARNISH TEST SERIES

Test	Resin	Oil	Oil Length	Cobalt Linoleate (lbs.)	Litharge (lbs.)	Minutes @ 560°F	Final Viscosity 50% N.V.	Final Color	Comments: Characteristics of Film After 18 hrs. Drying
11	Limed Rosin	Z Linseed Oil	30	1½	-	30	D-E	16	Tack free, good hardness.
12	Limed Rosin	Z Linseed Oil	30	2	-	30	F	16	No tack, good hardness better than - 12.
13	Limed Rosin	Z Linseed Oil	30	2½	-	30	F	16	Surface tack, fair thru hardness worse than 11 or 12.
14	Limed Rosin	Z Linseed Oil	30	3	-	30	F	16	Surface tack, fair hardness equal 13.
15	Limed Rosin	E Linseed Oil	30	1½	-	30	F	16	Repeat of (11) results checked.
16	Limed Rosin	E Linseed Oil	30	1½	3	30	I	14	Slight tack, soft film.
17	Limed Rosin	Z Linseed Oil	30	1½	-	60	G	16	Slight tack, soft film.

Objectives:

Comparison of amounts of cobalt drier.

Effect of lead drier.

Effect of longer processing.

TABLE III

VARNISH TEST SERIES

Test	Resin	Oil	Oil Length	Cobalt Linoleate (lbs.)	Litharge (lbs.)	Minutes @ 560°F	Final Viscosity 50% N.V.	Final Color	Comments: Characteristics of Film After 18 hrs. Drying
18	Limed Rosin	Z Linseed Oil	15	3/4	-	45	E	16	Definite tack, brittle film, good thru hardness.
19	Limed Rosin	Z Linseed Oil	18	7/8	-	45	E	16	Slight tack slightly brittle, will not ribbon.
20	Limed Rosin	Z Linseed Oil	20	1	-	45	E	16	Less tack than 19, hard film, film will ribbon.
21	Limed Rosin	Z Linseed Oil	22	1 1/8	-	45	E	16	Very slight tack, good hardness, good elasticity.
22	Limed Rosin	Z Linseed Oil	25	1 1/4	-	45	E	16	Very slight tack, good hardness, slightly gummy.
23	Limed Rosin	Z Linseed Oil	28	1 3/8	-	45	E	16	No tack, good hardness and thru dry.
24	Limed Rosin	Z Linseed Oil	30	1 1/2	-	45	H	14	No tack, good hardness and thru dry.
25	Limed Rosin	Z Linseed Oil	35	1 7/8	-	45	F	15	Slightly tacky, poor hardness.
26	Limed Rosin	Z Linseed 85%) Z3 Dehydrated) Castor Oil) 15%)	30	1 1/2	-	45	G	16	No tack, good hardness and thru dry.
27	Limed Rosin	Z Linseed 85%) Z3 Dehydrated) castor Oil 15%)	30	1 1/2	-	Oil 180 (S-3)	I	14	No tack, good hardness and thru dry.

Objectives:

Effect of variations in oil length.

Final Formulation (Based on all tests 1 to 26 inclusive).

Final Formulation recommended is test No. 27.

S-3 Oils bodied together to a cold string from paddle, then resin added, heated to 500°F, Cooled and thinned.

Table I shows the characterization of a commercial standard.

Table II evaluates the pattern of altered drier combinations.

Table III shows detailed tests which brought product to final design.

pigmented coating based on raw materials of the widest domestic availability.

Table I shows the first step — the characterization of a commercial standard. This is shown as Test 1. Tests 2 to 6 show the range of performance of limed rosin with the various oils considered, while Tests 7 to 10 characterize zinc resinate with the same oils.

Of these tests, No. 5 was selected as combining the most available and least expensive raw materials.

The trend can be seen to indicate that limed rosin was best with linseed oil while zinc resinate was best with dehydrated castor oil. Further work with zinc resinate was dropped because zinc resinate did not look favorable when used with linseed oil which is the most available oil.

Table II primarily evaluates the pattern of altered drier combinations. The original proportion of drier, i.e., 1½ lbs. of cobalt linoleate per batch was shown to be the most suitable for the purposes of drying at optimum hardness and tack-free condition. Test 7 informs us that prolonged cooking is undesirable.

The tests detailed in Table III brought the product into final design form. It was evident from tests 18 to 25 that the most suitable oil-length for this particular resin-oil combination is close to 30 gallons. Tests 26 and 27 were made to speed up the process of manufacture. Since Varnish No. 27 combined the requisites of good drying, sufficiently pale color, reasonable process time and low cost, further and more detailed testing was carried out on it. It was found to be quite stable on storage, it did not tolerate basic pigments but it did grind rapidly with non reactive pigments and prevented settling to a hard cake on the bottom of the can. Both the varnishes and enamels brushed easily. The standard pigmented films did not chalk badly in the weatherometer.

The test work and sample of the product were shown to two potential customers for their test work. One found it suitable and reasonably priced for use as an extender in interior enamels. The other found it very suitable as an inside clear varnish. They ordered the material and the new product was added to the line. Other orders followed.

Use of Negative Results

NEGATIVE results are in many cases as indicative as a positive result. Since you have a series of results, a cause-effect picture is developed and you can adjust in a desirable direction. To do this, consider the causes for good results, and attempting to remove some of the causes for undesirable results, it may be desirable to revamp the formula and work again with the customer.

Step-by-step, products specifically suited to a customer's use are thus designed.

New Types

IN considering new types of varnishes and vehicles, we have the choice of working:

a. To satisfy new requirements, or

b. To satisfy all the old requirements in an entirely new way.

Both approaches are again related to new raw materials, or the use of raw materials not heretofore used in this segment of the industry. When we develop for new needs, we first have to determine the need. This determination is a joint function of development, sale, and management. The need must be put into clearly defined terms and the actual need must be understood, so that all parties are aware of the actual goals of the development program. Development for new needs is a project type development indistinction to the continuing development work required for the constant improvement of existing types.

New needs can be seen in two ways: The first: sales department reports on a need not satisfied at the present time. The second: a new need is determined from examination of the structure of the user's business. To do this, we use a block chart and chart the current materials along one axis and chart places where they are used on another axis. Then you critically examine the chart and it will show that certain materials are going into uses where other materials would be much more suited. These are need points, whether our actual customer realizes his need or not. When we realize the need, a tentative material is formulated and produced on a small scale, and then the customer approached. He will quickly verify or give us information to re-evaluate our own information. We are then in a position to intelligently proceed with the development.

Factors in Development

VEHICLE formulation development brings out again and again to those actually engaged in it, a recognition that a gain in any particular property or set of properties will result in a loss of another property or set of properties. The business importance is to get the development department aware of the product that must be accentuated and aware of what properties can be sacrificed. How to do this? By close personal cross-contact between departments and, where necessary, close contact between the actual development man and the customer. Survey and structure technique enable a development group to utilize another natural advantage which has not been fully applied to date. This is the natural growth of knowledge. It is equivalent to keeping our detailed information coordinated in connection with materials available, products desired, applications, tests, test results and test methods. To do this, you constantly reclassify and interrelate your information, and use the coordinated structure as a building block for the foundation of new developments.

Balance and Control

THE operation of a development group for vehicles and varnish can be carried out economically and effectively if we plan, and predict, the effect of work if it is done before actually doing it. The value of actual work is enlarged when it is submitted to structural check for loop-holes and so arranged that the effect of trends and the relationship of masses of data is determined and utilized. Sound operations keep product design aimed at strengthening known industrial weaknesses.

Heat Polymerization of Safflower Oil

By

W. F. RHOADES A. J. Da VALLE

FOR SOME time the oil chemist has been intrigued by the potentialities of safflower seed oil in the field of drying oils and organic coatings (1, 2). However only during the last 12 months has safflower oil appeared on the competitive American vegetable oil market in sufficient quantity to stimulate interest in its commercial usage on a national scale. In view of the interest in this relatively new oil, a study was undertaken in an attempt to obtain some basic information regarding its heat bodying characteristics under practical conditions. With the wealth of information on the bodying of linseed oil under various conditions, it was felt that similar practical work on safflower oil, even though limited in scope, would be of general interest and value to the industry.

Polymerizing Rate

A STUDY was made of the polymerizing rate of safflower oil at temperatures of 575°, 585°, and 595°F. A commercial grade of safflower oil was processed in 1,000-gallon batches, and similar runs were made with linseed and soybean oils for the purpose of comparison. All cooks were made in the same kettle under identical conditions. In each case the oils were heated to 200°F.; at this point a vacuum of about 29½ inches and a mild inert gas sparge were applied to the kettle while heating was continued to gain polymerizing temperature. This temperature was maintained until the desired viscosity was reached, at which time the oil was cooled to 300°F. and vacuum released. In each cook samples were taken at intervals, and a sufficient amount of each sample was retained in order that accurate determinations of acid number, viscosity, iodine number, and refractive index could be made.

The safflower oil used in this study was a shipment from the 1950 California crop. The constants of this oil, together with the constants of the linseed and soybean oils used, are shown in Table 1. It should be noted that the iodine value of the linseed oil, though acceptable, is on the low side of commonly used specifications. However the rate of polymerization was normal and did not reflect the low iodine number.

The equipment used to obtain the data for this study was a commercial installation, comprising a 1,200-gallon stainless steel process kettle of recent design. It is equipped for use of high vacuum as provided by steam jet ejectors.

TABLE I

	Safflower		Linseed		Soybean	
	Initial	Final	Initial	Final	Initial	Final
Viscosity (Poises).....	0.4	55	0.4	56	0.4	40
(Gardner).....	A-	Z_3-Z_4	A-	Z_3-Z_4	A-	Z_2-Z_3
Color [a].....	10	4	7-8	6-7	6	7-8
Acid value.....	0.41	6.5	0.50	6.25	0.52	3.5
Iodine number.....	142	99.5	175	113	135.5	85
Refractive index...	1.474	1.484	1.478	1.489	1.4742-1.4763[b]	.....

[a] Gardner, 1933

Permission to publish this article was granted through the courtesy of The Journal of the American Oil Chemists' Society.

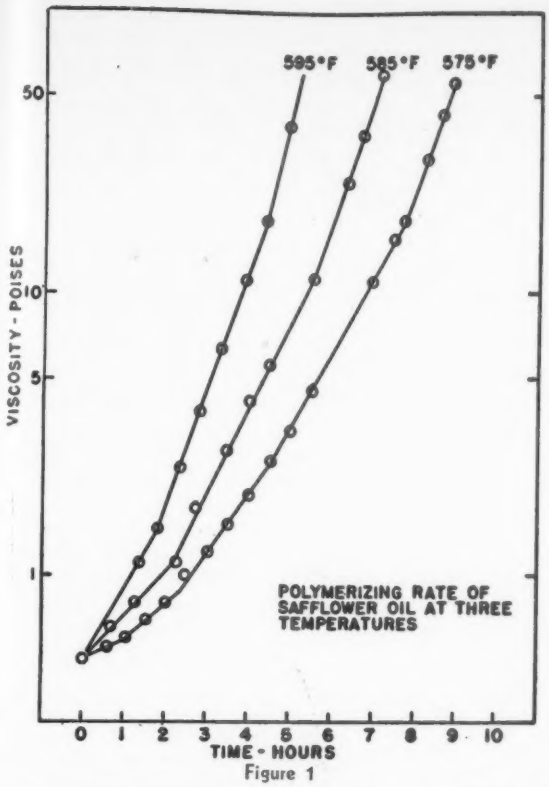


Figure 1

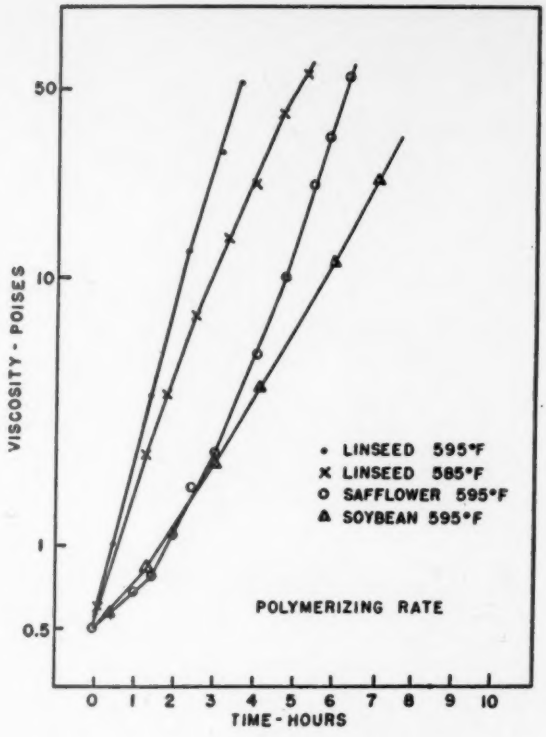


Figure 2

An inert gas sparge of nitrogen and carbon dioxide is used in conjunction with the vacuum, and vigorous agitation is supplied by a direct drive turbine type agitator. Instrumentation of this equipment was very helpful in the study inasmuch as an automatic temperature control of ± 2°F. was obtained during each of these cooks. Indirect natural gas fires are used as the heat source. Rapid cooling of the processed oil is obtained by use of internal stainless steel coils employing water as the cooling medium.

The data obtained from the various runs is presented in graphical form. Viscosity is chosen as the common denominator, and in all cases zero time is taken as the time at which polymerization temperature is reached. It should be mentioned that the acid number was easily maintained at a rather low level, between 5 and 7, during all the cooks, hence a comparison of the acid numbers of the various oils was considered to be of no significance.

Effect of Temperature

IN CONSIDERING the effect of temperature on the rate of polymerization (Fig. 1), it is found that safflower oil behaves in much the same manner as other fatty oils, possessing an appreciable degree of unsaturation. An increase of about 20°-25°F. in polymerizing temperature will result in a doubling of the average bodying rate (3). Close examination of the rate curves shows that the average bodying rate is not representative of the instantaneous rate at any given point, and it can be seen that the log viscosity-time curves for each of the three temperatures show definite discontinuities. These discontinuities are particularly apparent in both the 585°F. and 595°F. curves but are somewhat diffuse in the 575°F. curve. The curves are made up of three distinct linear segments. Although an explanation of this phenomenon is beyond the scope of this paper, it is interesting to note that discontinuities of a similar nature have been observed in work with other oils (4).

At this point we should like to mention that the effect of the processing equipment and procedure is extremely important in any study of this nature (5). The bodying rate and even the characteristics of the products are quite different

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Figure 3

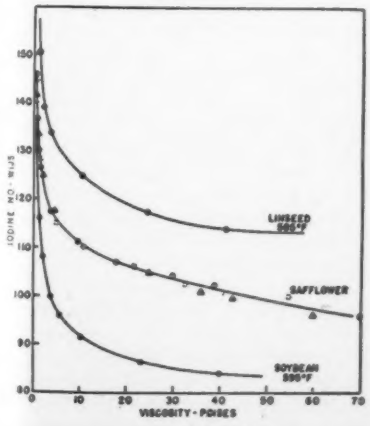
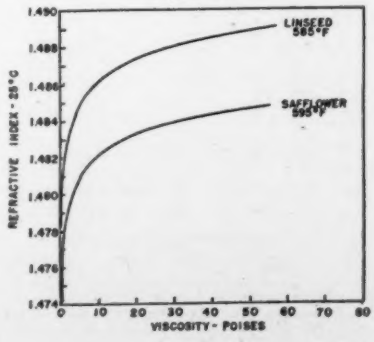
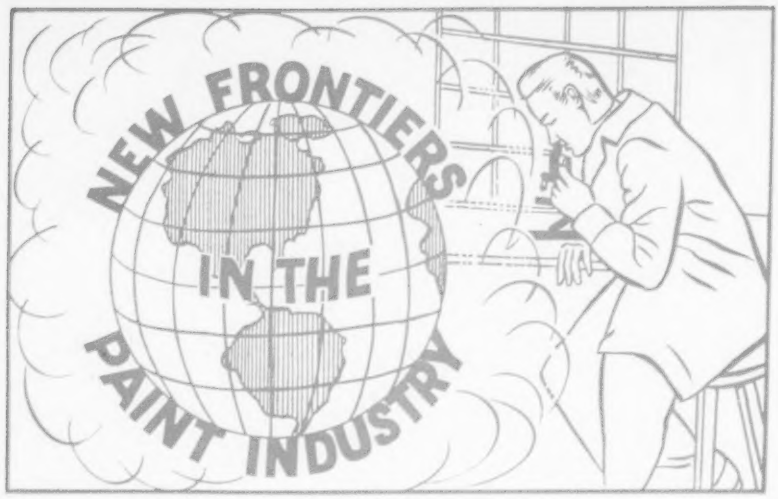


Figure 4





ALTHOUGH paper chromatography is little used outside the realm of the biological sciences, it is one of the simplest and yet most versatile analytical techniques known today. It makes possible the quantitative isolation of the various components of complex mixtures even when they are markedly similar in composition. Without this tool, biochemical progress would be almost at a standstill. Readily adaptable, this method can be utilized in almost any phase of chemistry. It is significant that much exploratory work in paper chromatography is being conducted at present in many industrial and university laboratories. Although no direct application to paint research has been reported as yet, to my knowledge, the potential value to the paint industry of such application makes chromatography worthy of consideration.*

Chromatography was invented by Tswett in 1906 while he was studying the nature of chlorophyll. He demonstrated its great utility in separating chemical substances. He also recognized the fact that it could be used with a wide variety of adsorbents, solvents and solutes and that it was applicable with colorless as well as colored materials.

Theoretical Background

According to Tswett's original method, the desired adsorbent is packed in a tube to form a column and the fluid being analyzed is passed through it. Here the column of the adsorbent is held motionless while the fluid moves. Relatively speaking, the fluid and adsorbent move in opposite directions. Thus chromatographic adsorption is a distribution process in which the adsorptive is distributed between a fluid and an interfacial phase. In this respect, chromatography is similar to fractional distillation, counter-current liquid-liquid extraction and other distribution processes.

On the other hand, partition chromatography is a method of separating substances by distributing them between two liquid phases, one of which is mobile and the other presumably fixed by sorption to a support. The support itself may or may not be active in the separation process. Partition chromatography is thus essentially a differential countercurrent application of the liquid-liquid distribution. The columnar or bulk application method employs a column of silica, gel, starch, or other adsorbent, to which is sorbed one fluid phase and over which the second fluid phase passes. The paper method, however, employs strips or sheets of filter paper to support the aqueous phase while the second organic phase, driven by capillary forces, passes over this. Although the same principles apply to both the columnar and the paper methods, the extreme simplicity of the apparatus involved in the paper methods makes them preferable.

The theory of partition chromatography is similar in many respects to the theory of the packed distilling column, but it is fortunate that an understanding of neither of these theories is necessary for successful operation and utilization of the chromatographic techniques. In order to characterize an unknown substance a value related to the distribution coefficient must be found. For this purpose a distribution term, called the R_f term, has been defined, in which the movement of the zone relative to that of the advancing front of the developer liquid (the mobile phase) is measured:

$$R_f = \frac{\text{movement of zone}}{\text{movement of advancing front of mobile phase}} = a/b$$

Despite its formidable appearance, the measurement of the R_f value is utterly simple. The center of the original spot in the paper chromatogram is taken as an origin and then the respective distances, (a), to the center of the developed spot or zone, and (b), to the front of the developer, are measured. (See Figure 1.)

General Techniques

In practice, the mixture to be separated is placed as a spot near the end of a sheet or strip of paper. This end of the paper is then dipped into the developer solution which rises by capillarity into the paper. The capillary flow would cease if the paper were left exposed to the air, for eventually the rate of movement of the liquid above the solution would be balanced by the evaporation from the large surface of the film. Therefore, the strip, or sheet, is confined in a chamber which is sealed. Under these conditions, the solvent front may move a considerable distance along the paper. With full-sized strips or sheets, the solvent front may travel 6 to 20 inches beyond the point of original application of the mixture. The latter point is usually about one inch above the top of the developer solution in which the paper is immersed.

After the solvent has moved sufficiently, the chamber is opened; the strip or sheet is removed and the various spots are examined. The components of a mixture are differentiated by the position of the spots. Those tending most to the organic phase move faster than the others. This is because the filter paper usually retains the aqueous phase, which permits the organic phase to move over it at a greater rate of speed. As a rule, the developer fluid contains organic solvents saturated with water.

The following technique, suggested by Kirby and Williams,[1] has become very popular recently because of its ease and simplicity. The solutions to be chromatographed are placed in measured small quantities on filter paper sheets that have been stapled in the form of cylinders. These paper cylinders are placed upright in 10 inch pyrex dishes containing the appropriate solvent for resolution of the chromatogram. The solvent dish rests on the bottom of a six-gallon earthenware crock which is covered with a square of plate glass. Whatman No. 1 filter paper is generally employed in sheets measuring 18″ x 11′. (It has been found that each of the many types of commercial filter paper offers advantages in use with specific systems

*A paper entitled, "Paper Chromatography of Polymethylol Phenols" was presented March 31, 1952 by J. H. Freeman before the Division of Paint, Varnish and Plastics Chemistry at the recent National American Chemical Society meeting in Milwaukee. This paper reports an indirect application of paper chromatography to the paint field.

but that the Whatman No. 1 is the best all-purpose paper.)

Solutions to be chromatographed are placed approximately one inch from the long edge of the sheet, leaving 10 inches for maximum ascent of the solvent, which is normally allowed to reach the top of the sheet. Then R_f values are conveniently measured with a transparent ruler graduated in millimeters. Under these circumstances solvent ascension takes about 24 hours, but it is often possible to save both time and paper by using smaller sheets.

When several solutions are to be chromatographed simultaneously, they are placed at one inch intervals along the sheet. A pencil run lightly along the edge of a ruler marks the chromatogram. Samples in five microliter amounts are applied to the paper with capillary pipettes. Whenever quantitative deductions are to be made, it is important that the initial spots be of uniform, small diameter.

The various solvent mixtures that have been employed for resolution have been formulated empirically and are useful in separating similar classes of compounds. The solvent blends are usually homogeneous mixtures of water, an aqueous phase and an organic solvent or solvents. For example, the following mixtures are often used in the separation of the amino acids:

100 parts phenol, 20 parts water
80 parts butanol, 20 parts glacial acetic acid, 20 parts water
80 parts butanol, 20 parts ethyl alcohol, 20 parts water
80 parts pyridine, 20 parts butanol, 20 parts water

Since there is no all-purpose developing solution, each investigator must find a blend particularly suitable for the separation of his interest. Once a satisfactory blend is obtained, the separation may be handled routinely and hundreds of analyses may be made daily with the minimum of equipment.

Localizing Spots

Before the R_f value can be computed, the spots have to be localized. If the unknowns are already colored, as in the case of dyestuffs or compounds such as picric acid or salts of copper, the analysis is quickly concluded by measuring their location with reference to the solvent front and computing the R_f values. If the mixture consists of colorless materials such as acetic, proprionic, butyric, citric and oxalic acids, it becomes necessary to determine their positions on the paper. Sometimes this requires considerable ingenuity but more often a simple application of ordinary chemical behavior to a two-dimensional system will suffice. In the latter instance, an acid-base indicator is used, generally an 0.04% solution of bromcresol green in 95% ethanol. This reagent is applied to the paper by a uniform mist spray. Acids form yellow spots against a blue-green background; alkalies intensify the basic blue color.

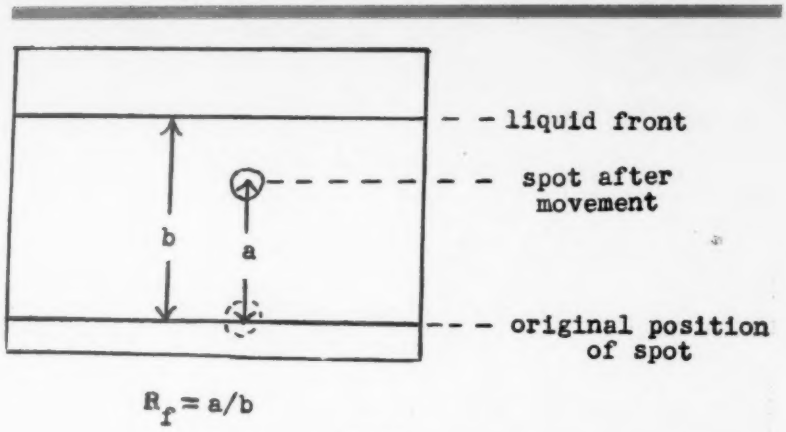


Figure 1

Almost every known analytical reaction, either organic or inorganic, may be modified. It is known, for example, that a solution of ferric chloride will form colored compounds with many phenols. Thus if phenolic constituents are being separated, the paper may be sprayed with a 1% aqueous solution of ferric chloride. Green to purple spots appear wherever the phenolic derivatives are located. To determine the position of potassium in a sodium-potassium separation, a dilute solution of lead cobaltinitrite is sprayed, resulting in brown spots of potassium against a light yellow background. Many of the standard analytical reactions have been modified for use on paper simply by dilution of the necessary reagents to permit a spray application. In the case of corrosive reagents, all-glass sprayers are used.

Identification

Known compounds are identified by the combination of the relative R_f values and the characteristic patterns of the spots. Unknown compounds can be identified by applying to the spots normal analytical techniques reduced to two dimensions. Thus, the approximate pH of the unknown can be estimated by spraying it with an acid-base indicator. Derivatives may be prepared on the paper and various color tests can be utilized in order to determine whether an unknown is phenolic, acidic, saturated, etc. Occasionally, the derivative of the unknown spot may be extracted from the paper and the melting point taken. In this way, step by step, further clues to the composition are uncovered.

Another method of identifying an unknown is to add to it a known sample of the suspected compound. If the two are the same the size of the spot will be increased. Even more positive identification can be effected when the known sample can be obtained in a radioactive form. If the two amino acids are the same then the position of the mixed spot will coincide with that of the radioactive spot, as determined by a radioautograph, and the detailed image, including all the irregularities in shape which occur in these spots, will be exactly the same for the spot and the radioautograph.

Under properly controlled conditions, the size of a developed spot on a chromatogram is generally indicative of the amount of substance present. This leads to two simple quantitative procedures; the visual comparison of color intensity and the measurement of spot area. By careful selection of solvent and color developing reagents, one can often obtain a reproducible color gradation. As in any colorimetric procedure, standard and unknown samples must be treated under as nearly identical conditions as possible. This is best achieved by running standard and unknown adjacently on the same chromatogram. When spots of the unknown do not exactly color-match the standard spots, interpolation is, of course, possible.

Where the area of a spot is a function of the concentration, measurement of the area of a known series of spots against the unknown will supply a good indication of the quantity of unknown. Here again, the know and unknown must be developed side by side under identical conditions. These methods may be further refined by means of isotope dilution techniques. For additional details of the chromatographic technique, one must refer to the current literature.

Applications in Paint Industry

In exploring the possible applications of paper chromatography to the paint industry, the following general uses suggest themselves:

1. Detection of Adulteration
a. Raw material control
b. Production control

c. Investigating customer complaints

2. Stain color matching and standardization

3. Research in film formation and deterioration

In all of these, simplicity of technique is the chief advantage. It will be seen that the mere separation of the components of a single spot on a sheet of filter paper can itself produce remarkable results.

Adulteration

As a rule, traditional methods of detecting raw material adulterants are time consuming and tedious and require expensive equipment and skilled technicians. Natural products, such as shellac, dammars, copals and the like, present many analytical difficulties. More often than not, the integrity of the supplier is an important factor. Paper chromatography obviates these difficulties, for one need merely prepare a chromatograph of the unknown and compare it with a chromatograph of the known standard. Any difference between the two spot patterns can be observed readily. The presence or absence of a conspicuous component is a definite sign of deviation from standard. This principle holds even when the melting point, acid number and color of the unknown match those of the standard.

The main requirement is a standard sample, of known quality and history, that is acceptable to both buyer and seller. The composition and significance of the spots on the chromatograph need not be known. Naturally the method requires some preliminary study by a research group to determine the best concentration and solvent and color development. In most cases, the color of the natural product will serve as its identification. Once the solvent has been established, then, the test becomes routine and can be performed by a control laboratory.

In respect to manufactured raw materials, the chromatographic test is equally applicable to other easily adulterated substances such as phenolic resins, drying oils and dyestuffs. A pure compound should result in only one spot. Any impurity in a drier, plasticizer, oil, resin, pigment (on dissolution), or antioxidant may introduce additional spots. The use of paper chromatography as an adjunct to regular control tests is recommended only for referee purposes in doubtful cases and for unusually sensitive products.

Production Control

Production control can be effected similarly. Oftentimes much effort is spent in correcting off-standard batches. Occasionally accidental contamination or production mistakes are such that no amount of effort can bring the product up to standard. Routine use of chromatography can spotlight such gross deviations, enable early rejection of worthless batches and prevent undue loss of time and materials in futile attempts at correction. Absence of a major spot and/or appearance of a new spot denote danger. Pigmented products can be centrifuged and only the vehicle portion need be chromatographed.

Finished Goods

Knowledge of the chromatographic characteristics of finished goods is valuable in answering customer complaints. By judicious use of paper chromatography, the offending product can be compared with the factory retain. A major difference may indicate that the product in question is not the one originally supplied or that the original product was grossly contaminated after shipment. In either event, a lengthy laboratory investigation can be avoided. On the other hand, if it appears that the product is the same, a full-scale investigation is in order.

Because so many complaints are based on faulty usage, such as mixing with old leftover paints of different manufacture or unwarranted addition of driers or varnish, a test which can promptly and satisfactorily establish that fact is obviously of great value. For example, analysis of driers is a lengthy procedure, but if the vehicle is chromatographed for the metallic components, the presence of a metal not in the original formula or an alteration of the original quota may be quickly determined. It is quite possible that a test can be designed in which the vehicle is used directly and the metal percentage can be established by the R_f value and the relative concentration in the spot area. In any event, a powerful tool is at hand which will ascertain the validity of complaints without upsetting the normal laboratory routine.

Stain color matching is often a hit-or-miss proposition which eludes the rigid control attending other phases of production and depends largely upon the skill of the color matcher. In this respect also, paper chromatography can be of great assistance to the paint industry.

In many cases, stains are a blend of four dyes: black, red, yellow and orange. Each batch can be chromatographed so that the several component dyes are separated, permitting an estimation of the relative quantities. Quite often the raw materials vary in strength sufficiently to prevent duplication by usual weight formulae. Therefore each batch must be modified by frequent color revision. Each incoming batch of dye can be standardized for color intensity at the same time it is tested for adulteration.

Color Matching

In color matching competitive products, truer matches can be obtained by estimating the relative proportion of dyestuffs as well as detecting the presence of unsuspected substances such as asphalts, natural gums or other resins. Here again, protection against unjustified complaints is afforded by checking an offending batch against the standard to detect the presence of unauthorized adulterants.

In considering the above suggestions, one must bear in mind that an unskilled worker can easily be trained in the simple chromatographic procedure. Color matching by resolution into components is practical. The color matcher need be taught only to deposit a known volume of dye solution upon the filter paper and immerse it into an appropriate solvent blend supplied by the laboratory. The entire color-matching procedure takes only a few minutes and is infinitely more precise than the usual trial and error method.

Film Studies

The application of this method to fundamental paint research presages even greater accomplishments. Students of film formation and film deterioration have claimed that among the many intermediate products are acids, ketones, aldehydes, alcohols and combinations of them. At no time has it been possible to analyze all the components simultaneously. Acids are usually reported as acidity in terms of formic, acetic or oleic acid; other materials are often reported as percent alcohol extractable. Paper chromatography enables the research scientist to simultaneously separate and identify each component.

Methods for identifying the lower volatile acids in the presence of each other have been published. Studies have been made of almost every possible intermediate allegedly detected during oxidation and procedures for their identification have been established.

Thus extracts from a given film former can be made periodically and each component therein can be separated and identified by chromatographic methods already reported in the literature. It is not difficult to see how a wealth of data can readily be accumulated which will lead to important conclusions.

It should be emphasized that chromatographic techniques are by no means limited to use with film formers but can easily be adapted for almost any organic reaction, including varnish making, resin manufacture, oil bodying, package instability or, in fact, any chemical change involving the formation of simple breakdown products. And it should

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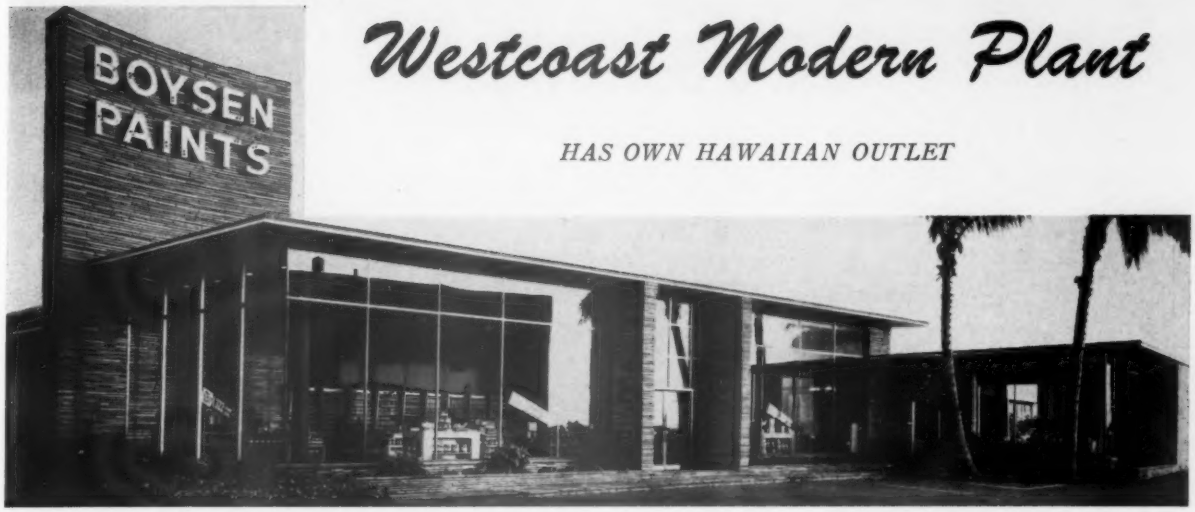
Westcoast Modern Plant

HAS OWN HAWAIIAN OUTLET



Present modern plant of Walter N. Boysen Co. in Oakland. First plant built in 1929 shown in inset.

OAKLAND, birthplace of many famous industrial plants, was the starting point of the Walter N. Boysen Paint Co.

The small factory built here in 1929 by Walter N. Boysen, a young paint salesman, has become "The Fastest Growing Paint Company in the West".

With financial aid of friends who believed in his ability, Boysen purchased the best paint making equipment available and opened for business with three employees.

Six months later the depression began. Spurred by courage, Boysen stayed in business while the market was taking a nose dive and kept his idea of real merchandising service going. Slowly, the 100% Pure Paint business grew. Two factory expansions came during the lean years and another $30,000 addition was made to the Boysen Co. in 1941. The little factory grew into a plant a dozen times as big as the original, a tribute to Oakland. In place of the 3 original employees there now number about 200 in the two Boysen factories, (Los Angeles and Oakland) 7 company owned retail stores, Seattle, San Francisco, San Jose, Oakland, Phoenix, San Mateo and Sacramento; two distributing warehouses, Seattle and Portland and in 1948 a beautiful new retail store and warehouse was built at 1661 Kapiolani Blvd. (The Miracle Mile) Honolulu. (See above view.)

Today the Boysen factory at 42nd and Linden Sts. is one of the most modern on the Coast. It is without a belt, shaft or pulley in the plant. Every machine has its own direct drive electric motor. A fact important in quality control is the factory's record as the cleanest paint plant in the west. Scientific testing insures quality in every can. Each batch of paint is tested individually for drying, color, workability, brushing and weight standard.

In October, 1949 the new office was completed. The $100,000 dream of Walter N. Boysen, the two-story, modern colonial style office building contains 12,000 sq. ft. Part of the lower floor is used for warehousing and the remainder is used for conference

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Walter N. Boysen Company present plant in Oakland. Inset shows first plant built in 1929.

P&V NEW PRODUCTS & IMPROVEMENTS

A MONTHLY MARKET SURVEY

ENG INEERS

DRUM RACK
Permits High Stacking

Construction is of welded square tubular steel, making it strong and capable of safely handling heavy loads.

Principal advantages are that the racks permit stacking drums to ceiling heights while at the same time selection of any drum can be made without shifting or disturbing others. Design permits removal by fork truck and horizontal position makes possible the use of faucets for drawing off small quantities. Design lends itself to ready knock down and rearrangement to meet changing warehouse conditions.

Initial racks are engineered for 55-gallon drums. Engineers will be glad to work with firms in designing racks for smaller size drums and special shape containers. Engineers at Equipment Manufacturing, Inc., 21550 Hoover Road, Detroit, Mich.

ALUMINUM DESICCATOR
Light Weight

Aluminum dessicator is said to weigh only a fraction of a comparable glass desiccator and cannot be damaged by bumping or dropping. Ground joint seal assures air tight closure and the aluminum body dissipates the heat quickly. Laboratory Industries, Inc., 4710 W. North Ave., Chicago 39, Ill.

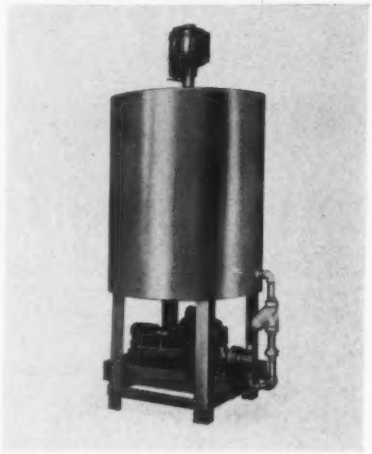
PRINTING VEHICLE
For Textiles

Textile printing vehicle permits color strengths believed to be unparalleled in textile printing history. Labeled G-E Glyptal alkyd resin 91033, the new vehicle keeps pigment particles apart, restraining the color particles from clustering together. Each individual color particle on the surface of the cloth thus contributes to the color of the textile print.

Savings in pigments are made possible with the high color yields of 91033. When green and blue pigments — the phthalocyanine colors — are used with G.E.'s new resin, only half the amount of pigment is required to get a color intensity equal to that obtained with conventional resins. The new vehicle also prevents pigment particles from running into the spaces between the fibers of the cloth and so contributes to the sharpness of the printing job. Prints made with 91033 have exceptional wash and crocking resistance. General Electric Co., Chemical Div. Pittsfield.

FILTER
Labor Saving

Style H Filter gives 2 to 3 times the flow rates of conventional filter presses, per sq. ft. of filter area. Flow rates up to 1000 gallons per minute; solids capacity up to 150 cubic feet. This filter is recommended for all standard liquid clarification where low headroom or other special reasons make its horizontal construction preferable to vertical tank pressure-leaf filter. For filtration where high percentage of solids must be removed and must be disposed of in the dry state. Maintenance labor is also held to a minimum, because the filter is simple. Leaf carriage operates as one unit; no moving parts. Niagara Filter Corp., 3080 Main St., Buffalo 14, N. Y.



BIRD-ARCHER

CHEMICAL FEED UNIT
Self-Contained

Chemical feed packaged unit, which delivers liquids in desired amounts under pressure, is ideally suited for feeding boiler water treatment as well as delivering chemicals and other fluids for processing.

This self-contained, extra heavy unit offers high pressure controlled feed at low cost. The chemical reservoir tank is of sturdy welded steel construction, available in 50 or 100 gallon capacity. The chemical proportioning pump can be designed for various rates of feed at different pressures. A specially designed motor-driven agitator assures completely mixed fluids at all times. Bird-Archer Co., 4337 N. American St., Philadelphia 40, Pa.

ELECTRIC STOPWATCH
For Laboratory Use

Special counting unit, with built-in reset mechanism, and high torque synchronous motor is designed to function as a single unit, thus providing smooth operation. No oiling necessary and has optimum visibility angle due to case design. Laboratory Industries, Inc., Chicago 39, Ill.

NEW PRODUCTS

STABILIZER
For PVC

Witco Stabilizer number 80 is a liquid stabilizer for polyvinyl chloride resins. The new stabilizer contains 100 per cent active ingredients consisting of barium and cadmium soaps in combination with a synergistic stabilizer.

The compounding of polyvinyl chloride formulations has been considerably simplified by the combination of the three stabilizers into one fluid composition, and this type of system is claimed to contribute stability against both heat and light degradation.

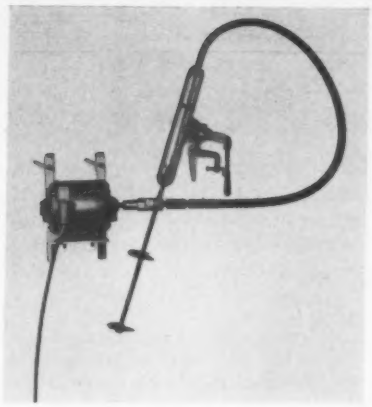
Stabilizer number 80 imparts good initial color and clarity to transparent sheets, is efficient under dynamic heat conditions, affords lubricity and release properties, and requires no pregrinding for complete dispersion. It is especially recommended for plastisols and organosols, and described in Technical Service Report S-6, Witco Chemical Company, 295 Madison Avenue, New York 17, New York.

MICROSCOPES
Polarizing Type

Microscopes are of improved design which features a patented trip-in Bertrand lens and a revised substage construction which permits full field illumination on all powers without complicated condenser fittings. Used in research work in paints and plastics. Manufactured by Cooke, Troughton & Simms, Ltd., these microscopes may be obtained from R. Y. Ferner Co., Inc., 110 Pleasant St., Malden 48, Mass.

BURETTE UNIT
With Plastic Reservoir

Burette unit features polyethylene reservoir which requires only a squeeze to fill an automatic self-leveling burette. Known as "Squeez-O-Matic," it is said to be easy and simple to use and a time-saver. It is resistant to chemical attack and will not contaminate standard titrating solutions. Available in 25-ml. and 10 ml. sizes graduated to tenth of a ml. Hagan Corp., 323 Fourth Ave., Pittsburgh, Pa.



PROCESS

PORTABLE MIXER
Light in Weight

Mixer with separate motor coupled to propeller shaft by flexible drive shaft is especially designed for agitator service. According to the manufacturer, the mixer, drive shaft, and motor are quickly and easily detached for carrying separately. No special motor is required, any standard horizontal motor can be used. Process Industries Engineers, Inc., 210 Whitfield Bldg., Pittsburgh, Pa.

WASHABILITY MACHINE
With Abrasion Attachment

Simple and rugged machine is used for testing washability characteristics of paints, varnishes, lacquers, linoleum, etc. According to the manufacturer, this unit enables laboratory and factory to produce exact specifications. This machine can be used very effectively in showing product performance in stores and sales meeting. Equipped with explosion-proof motor. For further details contact Gardner Laboratory, Inc., 4723 Elm St., Bethesda 14, Md.

MONOMERS
Varied Uses

Ethylene glycol dimethacrylate and diallyl maleate are two monomers recommended for such applications: polyesters, cross-linking in copolymerizations, resins, rubber, drying oils and coatings. American Monomer Corp., Leominster, Mass.

AMINOPROPANOL
For Evaluation

3-Aminopropanol available in trial lots for the first time for evaluation in the chemical and allied industries. The chemical properties of 3-aminopropanol are similar to those of other amino alcohols having primary amino and hydroxyl groups. However, the three-carbon separation between the two groups results in behavior more typical of the individual groups than is found in currently available amino alcohols.

It is suggested that this product be investigated for use in the synthesis of soaps and other surface active agents, dyestuffs, pharmaceuticals and resins. New Product Bulletin No. 25 describing its properties and experimental lots of 3-aminopropanol are available upon request. American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y.

MONOMER
Bifunctional Type

N, N' Methylenebisacrylamide is a reactive, bifunctional monomer which undergoes reactions typical of its vinyl and amide groups. It copolymerizes with such monomers as ethylene sulfonic acid, acrylic acid and chloromaleic acid to yield cross-linked, insoluble resins. Products having similar properties may also be obtained by reaction with polyester resins.

Simple addition to the double bonds occurs with secondary amines to give mixtures of mono—and diaminated products. N,N'-Methylenebisacrylamide also reacts with formaldehyde to yield a product which can be cured to a hard film.

N,N' —Methylenebisacrylamide should find use in molding compounds, surface coatings, textile finishes and ion-exchange resins. Its use as a cross-linking agent with other vinyl monomers is particularly interesting and warrants further investigation.

Samples and further technical data may be obtained from the New Product Development Department, American Cyanamid Company, 30 Rockefeller Plaza, New York 20, New York.

NEW PRODUCTS

METERING DEVICE
Permits Simple Adjustments

Metering device, V/A cell, introduces to industry an entirely new approach to orifice metering. Instead of measuring the static-pressure differential across the orifice (as do conventional mercury manometers) the unit meters a continuous by-pass stream around that orifice.

Thus, the metering is kinetic — a constant flow continuously purges the lead lines.

Second, a linear relationship exists between the metered by-pass flow and the main flow past the orifice — avoiding the square-root relationship between manometer action and orifice flow which has so long plagued orifice metering. The linearity and the consequent ten to one rangeability is inherent in the new method.

Third, the new method permits very simple adjustment of the by-pass rate, to give the unit enormous flexibility (usefulness over widely different flow ranges.)

A fourth important attribute of the V/A Cell as applied to orifice metering is its adaptability to pneumatic connection to points remote from the orifice run.

In the chemical process industries, these characteristics (kinetic action, linearity, rangeability, flexibility and pneumatic transmission) mean: (1) less freeze-up in outside locations where aqueous phases or condensation would collect at the orifice taps; (2) no purge system required; (3) greater linear-scale chart accuracy at low flows; (4) the ability to meter corrosive, and reasonably heavy or even emulsified fluids; (5) range-ability enough to meter widely different flows as processes and plant capacities change; and (6) compatibility with existing pneumatic instrumentation. Fischer & Porter Co., Hatboro, Pa.

pH METERS
Varied Uses

The new instrument is designed for all pH and rH work, for potentiometric titrations and for oxidation-reduction-potential investigations.

For laboratory research and industrial testing purposes it provides a measuring accuracy of 0.01 pH or 0.5 mv., a range of 0—14.15 pH and 0—1415 mv. absolutely currentless measuring with no phenomena of polarization, zero indication by cathode ray tube, can be used with glass, quinhydrone, hydrogen and platina electrodes and is direct calibrated for the first three.

The pH meter is supplied with the new, removable Philips calomel and glass electrode and is provided with controls which correct for temperature variations and for assymmetric potentials. Unit has a built-in Philips cadmium standard cell and a flexible cable with a plug for connection to a 60 cycle a.c. power supply circuit. Transformer taps can be changed to accommodate voltages of 110, 125, 145, 200, 220 and 245. North American Philips Co., Inc., 750 South Fulton Ave., Mt. Vernon, N. Y.

PAINT HEATER
For Small Quantities

The Bede Model R Paint Heater offers wide versatility, heating from a small quantity of lacquer or enamel, up to six quarts at one time. Finishes can be heated directly in the gun-cup, in original containers up to a gallon, or mixed in the heater pot. Its wide range of use, from small touchups to complete refinishing jobs, makes it unnecessary to purchase multiple units.

The heating element is cast in an aluminum explosion-proof housing, which also contains all electrical controls. An adjustable thermostat accurately controls and maintains paint heat at the temperature desired. A safety fuse automatically prevents overheating. Bede Products, Inc., Cleveland, Ohio.

COMPACT SIZE PUMP
Positive Displacement

Pump with capacity of 1½ gpm down to ¼ gpm is suitable for handling light viscosity fluids. Known as Magna-Mite Pump, this unit is similar to vane type pumps. Cylindrical in shape with a diameter of 2¾ inches and 6 inches long overall. Types available are adjustable displacement, constant displacement, and variable and reversible displacement. Milwaukee Hydropower, Inc., 3447 N. 35th St., Milwaukee 16, Wis.

PLASTICIZER
Low Temperature Flexibility

Monoplex S-71, is a new, low-cost plasticizer for vinyl compounds. Light and clear in color, of low volatility and viscosity, able to impart low brittle point values, and having good plasticizing efficiency, Monoplex S-71 closely parallels Monoplex DOS (dioctyl sebacate.) The new plasticizer offers two important advantages: it is not only less expensive than Monoplex DOS, but effectively increases the stability of vinyl resins under heat and light.

Monoplex S-71 is recommended for use in upholstery sheeting, fabric coatings, light-weight film, garden hose, electrical jacketing, dispersion compounds for casting and slush molding, injection molding, and rigid or semi-rigid vinyl products. Rohm & Haas Co., Washington Sq., Philadelphia, Pa.

WEIGHT FEEDER
3-60 lbs. per Hour

Waytrol constant weight feeders are based on the balance principle. Material is delivered from a hopper by a vibrating electric feeder. It falls on a "weight-belt" which corresponds to one arm of the balance. Other arm is a standard weighing beam with sliding weights. Position of beam controls the vibrator feed rate through an on-off control. Photoelectric control is the chief innovation in this small feeder. The Jeffrey Manufacturing Co., Columbus 16, Ohio.

DUST RESPIRATOR
Light in Weight

Respirator, called Dustfoe #55 weighs only 2¾ ounces. Breathing resistance has been cut in half, with users of pilot models reporting they were "hardly conscious of wearing a respirator." Reduction in width of the filter holder eliminates a "blind-spot" area and greatly increases the downward vision. Mine Safety Appliances Co., Braddock, Thomas and Meade Streets, Pittsburgh 8, Pa.

News about

B. F. Goodrich Chemical *raw materials*

See how Hycar latex helps your paint formulations

- ★ *Non tacky*
- ★ *Heat resistance*
- ★ *Adhesive properties*
- ★ *Excellent pigment binder*
- ★ *Solvent and oil resistance*
- ★ *Abrasion resistance*
- ★ *Compatibility with wide variety of synthetic resins*

Used as a pigment binder in many fields, Hycar latex has properties and advantages that make it highly useful in developing or improving paint formulations.

Fill in and mail the coupon below for technical bulletins or experimental samples of Hycar latex. Your inquiry will be answered promptly.

B. F. Goodrich Chemical Company
A Division of The B. F. Goodrich Company

Hycar
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American Rubber

Dept. HS-4
B. F. Goodrich Chemical Company • Rose Bldg. • Cleveland 15, Ohio

Please send me technical bulletins on Hycar latex____
(If experimental samples wanted, please check here____)

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers • HARMON organic colors


REICHHOLD
ANNOUNCING
See "America's Town Meeting" on TV every Sunday on ABC presented by Reichhold as a public service.
Creative Chemistry...Your Partner in Progress

NEW PRODUCTS

PHTHALOCYANINE BLUES
Improved Types

Aquamarine Blue #1670 is a 20% blue in paste form. It is dispersed in water and contains a dispersing agent. Application tests indicate that Aquamarine Blue is particularly suitable for water paints, water colors, latex emulsions, wall paper colors, natural and synthetic leather finishes — the latter because coloring is done in a water slurry. For latex type emulsions, where the blue cannot be "ground in" and where water dispersible color is required, this blue pigment can be mixed in without grinding. Tests showed that this Blue is compatible in all commercially available latex emulsion paints.

Synthaline Blue #1950 is a dry phthalocyanine blue that is non-dusting and non-crystallizing. It can be used in the production of any product for which a non-crystallizing blue is desirable. Advantages include ease of grinding, ease of dispersion, low oil absorption.

Synthaline Blue Flushed #1949 composition is 20% blue, 40% long oil alkyd, 40% solvent. Potential uses are in the manufacture of paints and enamels. Principal features include soft body, complete resistance to crystallization, easy dispersion in paint vehicles and the fact that no further milling is required. Whittaker, Clark & Daniels, Inc., 260 West Broadway, New York, N. Y.

DRUM UP-ENDER
Insures Safety

A safe method of tilting and emptying heavy drums is provided by a manual drum up-ender.

This up-ender consists of two shoes which slip over the forks of any standard fork truck. To the shoes are welded rubber-faced grab plates that clamp around the drum to hold it firm. An arm on each shoe supports the handle used to up-end drums for emptying.

One advantage of the new device is that drums can be safely emptied from any height within comfortable arm reach of the worker. Drums are carried in a vertical position and can be tilted forward to a horizontal position for stacking or 45 degrees below horizontal for emptying. Baker Industrial Truck Div., Baker-Raulang Co., 1250 W. 80th St., Cleveland 2, Ohio.

BASKET
For Pipette Washer

A new basket for the Fisher pipette washer has been produced by The Fischer Scientific Company's Development Laboratories. The stainless-steel basket supports pipettes for storing, washing, rinsing and transferring, and replaces the previous pipette holder (which was made of light metal bands). In the improved model there is no possible chance for pipettes to protrude beyond the sides of the holder to be chipped or broken while being washed. The basket is a slightly tapered cylinder, four inches in diameter at the top. The bottom is heavy mesh screen welded to the cylinder.

All parts of the improved Fisher pipette washer are made of corrosion-resistant material — glass, stainless steel (18-8) and rubber. It will accommodate pipettes up to 18 inches long; the basket will hold as many as 125 pipettes seven mm. in diameter, proportionate quantities of other sizes. Fisher Scientific Company, 717 Forbes St., Pittsburgh 19, Pa.

SPECIFICATION DATA
LIQUID PAINT DRIERS

FEDERAL SPECIFICATION TT-D-643

Type I — Lead 24%
Type II — Cobalt 6%
Type III — Manganese 6%
Type IV — Zinc 8%

Oronite Liquid Naphthenates meet these specifications as we supply them.

FEDERAL SPECIFICATION TT-D-651a

	Minimum	*Recommended*
Oronite Lead 24%	10.5 lbs.	10.5 lbs.
Oronite Manganese 6%	5.0 lbs.	7.0 lbs.
Mineral Spirits	84.5 lbs.	82.5 lbs.
	100.0 lbs.	100.0 lbs.
Metal contents:	2.5% Pb, 0.3% Mn	2.5% Pb, 0.42% Mn

Type II is a straight cobalt drier with no lead permitted. Minimum cobalt content 0.6%, results from diluting one hundred (100) weights of Oronite Cobalt 6% with nine hundred (900) weights of suitable mineral spirits. Better drying results from using a drier of 0.76% Cobalt content made from 127 wts. of Oronite Cobalt 6% plus 873 weights of mineral spirits.

A.S.T.M. SPECIFICATION D600—43

Covers a number of Dilute Driers. Those of Class B with their stipulated minimum metal contents are listed below together with the batch proportions to produce them from standard Oronite Naphthenates.

	Lead-Mang.		Lead-Cob.		Cobalt		Mang.	Lead
	Min.	Better	Min.	Better	Min.	Better	Min.	Min.
Materials								
Oronite Lead 24%	105	210	105	198	0	0	0	210
Oronite Cobalt 6%	0	0	42.5	95	100	127	0	0
Oronite Manganese 6%	100	100	0	0	0	0	167	0
Petroleum Solvent	795	690	852.5	707	900	873	833	790
Metal Contents								
Lead	2.5	5.0	2.5	4.75	0.0	0.0	0.0	5.0
Cobalt	0.0	0.0	.25	0.57	0.6	0.76	0.0	0.0
Manganese	0.6	0.6	0.0	0.0	0.0	0.0	1.0	0.0

ORONITE 8% COPPER NAPHTHENATE

Specification CS-152-48 — Oronite 8% Copper

MIL-T-11293 (CE) Type I
MIL-P-906A (SHIPS) Type A
} Acceptable for use in these specifications

REPRESENTING NAFTONE, INC. IN THE NEW YORK METROPOLITAN AREA.

JOHN H. CALO COMPANY
INCORPORATED

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NEW YORK 6, N.Y.

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WHITEHALL 3-6866

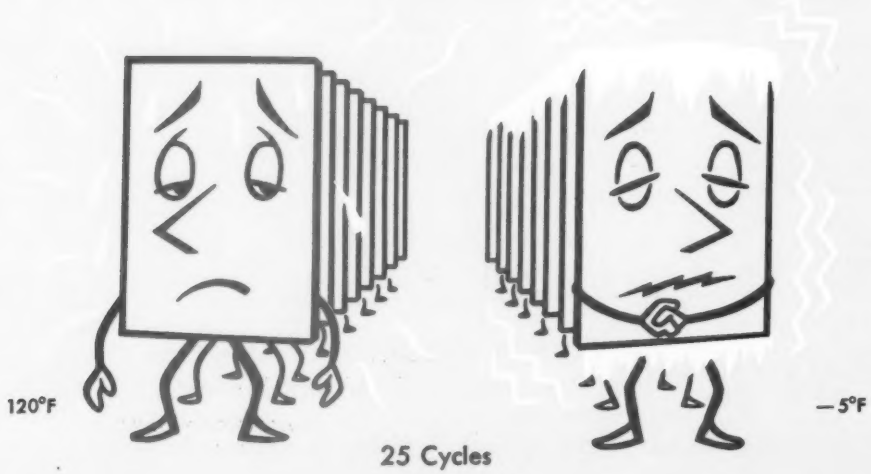
now you can have furniture lacquers that resist

Lacquers based on
resist cold checking

Since cold checking is the prime cause of failures in nitrocellulose furniture lacquers,

at home

Over a period of 8 years, scores of panels coated with lacquers using REZYL 50-5, in various formulations were subjected to this stiff test:
120°F for 60 minutes, followed immediately by 60 minutes at −5°F . . .
for 25 cycles. Many of these panels showed no sign of checking . . . even after they had aged for 5 years! Using the successful formulations we went on to step 2.



25 Cycles

. . . first one and then the other for 60 minutes each.

in addition REZYL 50-5 offers

HIGH SOLIDS CONTENT • PRACTICAL WITH LOW VISCOSITY NITROCELLULOSE
NO TREATED OILS NEEDED • UNUSUAL BUILD, GLOSS, CLARITY

Write or phone today for technical bulletins, samples, the help of our technicians. REZYL 50-5

cold checking under any climatic conditions

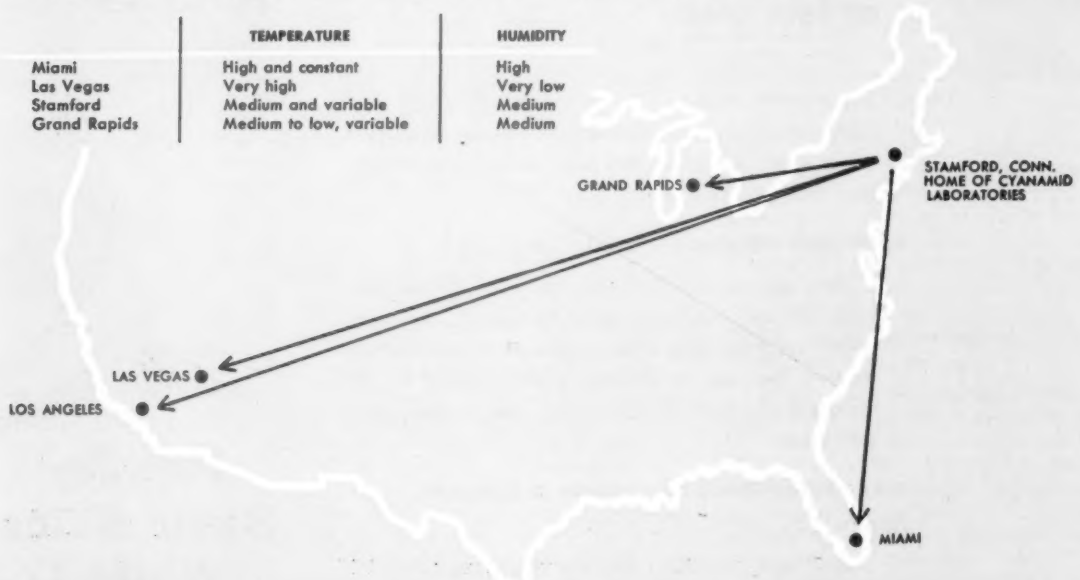
REZYL® Resin 50-5 for years...not weeks

Cyanamid submitted REZYL 50-5 Resin to exhaustive tests on both fresh and aged films.•

2 out in the world

—the real "proof of the pudding." The test results were correlated with interior exposures at each of the following locales which typify climatic extremes:

	TEMPERATURE	HUMIDITY
Miami	High and constant	High
Las Vegas	Very high	Very low
Stamford	Medium and variable	Medium
Grand Rapids	Medium to low, variable	Medium



Again, panels that *stood up*, and showed no signs of checking.

the **following important advantages:**

NO CHEMICAL PLASTICIZERS NEEDED
GOOD RUBBING AND POLISHING

will help you meet the stiff competition of today and tomorrow.

AMERICAN Cyanamid COMPANY
COATING RESINS DEPARTMENT
30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

How to put more life into your

tinted house paints

at less cost

There've "been some changes made" in tinted house paint formulations in the past two years. Manufacturer after manufacturer has switched to Dutch Boy Basic Silicate White Lead "45 X."

All the advantages of "lead," plus . . .

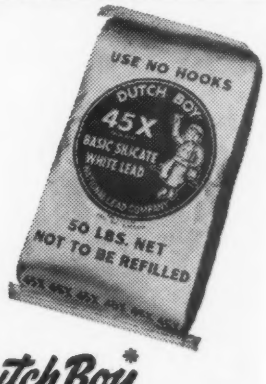
You get dependable unformity of appearance with this new pigment: first, because it decreases water sorption and, thus, improves film integrity; second, because it makes a film that's highly resistant to rapid chalking and that releases dirt uniformly.

And you get these advantages at less cost. Here's why . . .

In Dutch Boy Basic Silicate White Lead "45 X," the reactive portion of each pigment particle is concentrated at the surface. This makes available proportionately larger amounts of "lead."

What's more, you use fewer pounds of "lead." 60 to 63 weight units of Dutch Boy Basic Silicate White Lead "45 X" equal 100 weight units of standard white lead types.

Cut costs . . . increase the decorative and protective life of your tinted house paints. Use Dutch Boy Basic Silicate White Lead "45 X" in your formulations.



Dutch Boy* Basic Silicate White Lead "45 X"

"lead" at its efficient, economical best

NATIONAL LEAD COMPANY: *New York 6; Atlanta; Buffalo 3; Chicago 8; Cincinnati 3; Cleveland 13; Dallas 2; Philadelphia 25; Pittsburgh 12; St. Louis 1; San Francisco 10; Boston 6 (National Lead Co. of Mass.).*

*Reg. U. S. Pat. Off.

Francis G. Smith

Rutile Pigments Discussed at March Meeting of N.Y. Club

The New York Paint and Varnish Production Club held its regular monthly meeting on March 6, 1952 in New York City. Two hundred and sixty-five members and guests attended to hear Francis G. Smith speak on "The Value of Rutile Pigments in Exterior Finishes". Mr. Smith, a graduate of Lehigh University has been with the Technical Service Department of the Titanium Pigment Corporation for the past fifteen years. At present he is manager of the Titanium Pigment Paint Test Station at Sayville, New York.

In his paper, Mr. Smith pointed out that since the introduction of titanium pigments, most of the improvements in exterior house paints can be attributed to basic properties available in titanium dioxide and to improvements in pigment properties.

When rutile titanium dioxide was introduced many formulators, because of hiding and cost considerations, substituted the new rutile pigments in exterior paints without due consideration ultimate weathering properties. As it turned out, dirt collection was excessive and mildew was greater than in the case of anatase pigments. In addition, an objectionable yellow tone developed under certain conditions of light and moisture. When these faults became evident most formulators abandoned the idea of using the rutile pigments and went back to the use of anatase for white house paints. The use of rutile being confined to tinted house paints because of the added durability.

Certain principles of house paint formulation were derived from the development work done at Sayville according to Mr. Smith. He believes that good white house paints can be developed by formulators through the proper use of these principles.

Briefly, by properly balancing the titanium pigment types with the reactive pigments, lead and zinc types, excellent and durable paints are possible.

The reactive pigment portion is important and must be considered along with the titaniums in the formulation of a paint to get a clean film and good durability. Tests indicate that the reactive pigment portion, based on the total pigmentation, should be below 60% for durability and above 40% for good cleanup. In either case, about half the reactive pigment should be zinc oxide.

In lead-free paints tests indicate that three pounds of zinc oxide is usually sufficient to prevent dirt collection.

Set up in the meeting room were the actual exposures, on sections of house siding, of the paints under discussion. Mr. Smith went on to demonstrate by means of the exposures how various pigment combinations perform. A comparison was shown of anatase paints versus rutile paints with the only variable being the titanium pigment. Both paints had been exposed for a period of five years. The rutile pigment paint still protected the surface and was in good condition for repainting. The anatase paint had completely chalked away and offered no protection to the surface. However, while the rutile paint showed good durability, they still could not be considered as acceptable commercial paints. Repeat tests of the same paints but with short exposures showed clean, white, mildew free panels for the anatase paints and dirty, mildewed surfaces for the rutile versions. It was obvious that even the freest chalking rutile pigments would not chalk soon enough to give good cleanup.

The answer, according to Mr. Smith, is in the use of a combination of rutile and anatase pigments. If a minimum of one third of the titanium pigment is free-chalking anatase and the balance free-chalking rutile satisfactory, cleanup can be obtained.

Calcium-base pigments can also be used successfully by following the same basic principles as to types of titanium used. The calcium sulfate content does not seem to have any detrimental effect on durability.

Other panels were exhibited which showed the effects of varying the reactive pigment content on cleanup and mildew. Lead-free paints, for example, showed satisfactory results if the zinc oxide content was in the 2.75 to 3.25 pounds per gallon of paint range. Lower zinc oxide percentages resulted in excessive dirt collection. Still other panels illustrated how the lower oil content and higher pigment volume concentration would improve the appearance of white paints and make variations in the reactive pigments less noticeable.

Mr. Smith then proceeded to show that there is still a need for special primers despite the excellent job being done by the self-prime finish paints so widely in use today. For these primers it is again the rutile titanium that outperforms the anatase. In this case the most chalk resistant rutile type of titanium is recommended. The vehicle used in the primers should have a controlled penetration so that there will be enough oil left to satisfy the pigment demand.

Exposures of a light colored metal primer was demonstrated to show the outstanding performance of the rutile version over the anatase for durability. The primer, in an alkyd base can be made to equal the durability of standard dark colored metal primers.

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E. Hinner and P. Mayfield Elected Directors of Hercules Powder Co.

Two new directors of Hercules Powder Company were elected recently at the company's annual meeting, held in the Delaware Trust Building.

The new board members are: Elmer F. Hinner, general manager of the Virginia Cellulose Department, and Paul Mayfield, general manager of the Naval Stores Department.

All other members of the board of directors were re-elected for the ensuing year. They are: Leavitt N. Bent, Wyly M. Billing, Russell H. Dunham, William R. Ellis, Albert E. Forster, John J. B. Fulenwider, Charles A. Higgins, John B. Johnson, Francis J. Kennerley, Mahlon G. Milliken, Edward B. Morrow, Anson B. Nixon, Reginald Rockwell, and Philip B. Stull.

•

Canco Expands Container Development Activities

Creation of a new Packaging Development Division in the American Can Company's General Sales Department, designed to further step up the company's continuing program for developing new containers and new uses for existing ones, has been announced by T. E. Alwyn, vice president of sales.

The new division will serve as a coordinating agency between sales, manufacturing, research and other company departments, Mr. Alwyn said. Particular interest of the division will be centered on the development of containers under Canco's "Operation Survival" program, long-range research project which seeks perfection of containers made entirely from materials available on the North American continent. Operation of the new packaging division will be under the supervision of T. F. Brennan, who has been named manager.

J. D. D'Ianni

A. J. Gracia

Key Changes at Goodyear

Important key assignments in research and development activities of The Goodyear Tire & Rubber Company, have been announced here by Dr. R. P. Dinsmore, vice president in charge of these phases of the company's operations.

A. J. Gracia, who has been affiliated with the office of the vice president, Dr. Dinsmore announces, has been named assistant manager of research and development activities.

The post left vacant by Gracia's promotion has been filled by James D. D'Ianni, previously in charge of research studies on synthetic rubbers and vinyl plastics materials.

Other assignments listed by Dr. Dinsmore were those of H. J. Osterhof as director of research; and W. W. Vogt, development manager of the Tire and Compounding Division.

Working under Dr. Osterhof's direction at the company's Research laboratory, Dr. Dinsmore said, are A. M. Clifford, manager of Organic Research; J. A. Merrill, manager of Engineering Research; and H. A. Endres, manager of Rubber and Plastics Research.

•

A. Scharwachter Elected Pres. of Tall Oil Ass'n.

A. Scharawachter of Arizona Chemical Co., and J. A. Auchter of North Carolina Pulp Co. were elected president and vice president respectively of the Tall Oil Association.

The association, formed originally to collect data and statistics relating to tall oil, has been concentrating more recently on the development and distribution of bulletins of information on the uses and handling of crude and refined tall oil. Dr. A. Pollak acts as technical consultant of the association and Dernell Every is secretary-treasurer with offices at 122 E. 42nd St., New York 17, N. Y.

D. H. Litter presents gold watch to Elias Singer at farewell dinner.

Elias Singer Becomes Partner In Troy Chemical Company

Elias Singer, for the past nineteen years technical director of D. H. Litter Co., Inc., manufacturers' representatives in the New York and Boston, has resigned his post to become a partner in the Troy Chemical Co.

At a farewell dinner attended by his friends and associates, D. H. Litter, president, presented his former employee with a gold watch in appreciation of his years of service, and offered best wishes on behalf of himself and his firm for Mr. Singer's future success.

Problem of Rosin in Paints Discussed at ASTM Meeting

This is a resume of a discussion on the problem of rosin in exterior paints held at the A.S.T.M. Meeting in Cleveland on March 3rd.

The matter of a quantitative method for small amounts of rosin first came up about a year ago when a short supply of naphthenic acid made it appear that naphthenate driers would have to drop out of the picture in favor of tallate driers. The tallate driers contain tall oil which responds positive to qualitative rosin tests.

Most government specifications for paints, varnishes and enamels specify that no rosin shall be present as determined by the Liebermann Storch Test. But it is clearly unfair to government purchasers as well as to manufacturers of paints to keep specifications in force that eliminate the possibility of using tallate driers, which constitute less than ½% of the actual paint, simply because the use of tallate driers cause a positive rosin test.

In addition, critical review of methods for determining the actual rosin content of paints, varnishes and lacquers, where rosin contents are in the range of 0.1% to 10.0% when tested by an A. S. T. M. group revealed that no method available today is satisfactory.

A. S. T. M. formed a subgroup of Committee *IX* on Varnishes of Committee D-1. This group reported its first findings at Cleveland on March 3rd.

The results of this subcommittee made clear to all that the information that the industry has on the detection, determination of rosin in finishes does not add up to a consistent picture. For example in cooperative testing, many found that pure bodied linseed oil responded to a positive test for rosin, while in a quantitative test, petroleum resin showed up as a rosin.

The new A. S. T. M. group is vigorously attacking these preplexing problems. The personnel cooperating in the group represent all facets of industry including; besides representatives of the coating materials industry, men connected with rosin, tall oil, driers, oils, resins, chemical and varnish manufacture.

The fact that a coordinated and direct acting technically sound group has formed, is a favorable indication of the growing systematization of our paint industry.

The large attendance at the group meeting and the many problems discussed reemphasized the attention this subject is receiving from the industry.

•

Hardesty Appoints Carlin

W. C. Hardesty Co., Inc. has announced the appointment of Mr. William J. Carlin to their fatty acid sales staff. Mr. Carlin has a Bachelor of Chemistry degree from Brooklyn Polytechnic Institute and formerly worked for E. F. Drew & Co. He will sell Hardesty's complete line of Fatty Acids in the Middle Atlantic States.

Our Coconut Fatty Acids Merit a Doctor's Degree

Like a well-qualified M.D., our coconut fatty acids go through a highly specialized processing period before beginning to practice in your manufacturing operation.

For example, our Special grade has had a major portion of the lower acids (caproic, caprylic and capric) removed to give a product particularly suited for resin, detergent and cosmetic manufacture.

And our Regular grade—a single distilled acid—is so carefully controlled that it is equal to many double distilled grades, and is of course less expensive.

Send for samples and our booklet "Fatty Acids in Modern Industry." You'll agree that our products live up to the promises made for them.

A. GROSS & COMPANY

A. GROSS & Company

295 MADISON AVENUE, NEW YORK 17, N. Y.

MANUFACTURERS SINCE 1837

Distributors in Principal Cities **Factory: Newark, N. J.**

J. E. Newman

J. E. Newman Named Mgr. of Amsco's Wax Department

John E. Newman has been appointed Manager of Amsco's Wax Department, according to an announcement by Edward M. Toby, Jr., President of American Mineral Spirits Company. This represents another step in the expansion of Amsco's activity in the specialized petroleum and chemical field which was inaugurated with the construction of their modern warehouse and distribution facilities at Carteret, New Jersey in 1948.

•

Roy Sheeler of Du Pont Finishes Retires

Roy C. Sheeler, assistant to the manager of trade sales of the Du Pont Company's Finishes Division, retired recently after more than 29 years with the company and 43 years in the paint business.

Mr. Sheeler joined the Du Pont Company in October, 1922, to edit "Principles and Practices of Upkeep Painting," a publication devoted to maintenance painting.

Mr. Sheeler later handled engineering and technical problems in connection with trade sales of the Finishes Division, and then became assistant sales manager of maintenance and upkeep sales. He was appointed assistant manager of the Prescription Paint Service Division when it was organized in 1926. He was sales technical adviser in the Finishes eastern division in Philadelphia from 1933 until 1937, when he became assistant to the manager of trade sales.

Morehouse Appoints N. California Agent

Appointment of Pacific Coast Chemicals Company of San Francisco as exclusive Northern California agents for Morehouse Industries, Los Angeles, manufacturers of Speedline Mills has been announced by George E. Missbach, sales manager for Morehouse. Frank G. Collins will be in charge of Speedline sales and service for Pacific Coast Chemicals.

Pacific Coast Chemicals Company, organized by Harold M. Brez in 1949 to market chemicals to west coast industry and agriculture, will sell Speedline mills to the paint, food, ceramic, grease and pharmaceutical industries.

Speedline milling equipment employs the basic Morehouse principle of an adjustable grinding stone revolving at high speed in a horizontal plane against a stationary stone. Material to be processed is fed through the stones.

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Metals Disintegrating Company Appoints Atlanta Distributor

The appointment of R. T. Hopkins of Atlanta, Ga., as a distributor of its MD Aluminum Pastes and Powders and MD Gold Bronze Powders in the states of Georgia and Florida, has been announced by Metals Disintegrating Company, Inc., Elizabeth, N. J., manufacturers of metal pigments, metal abrasives and metal powders.

Available stocks of MD Aluminum Pastes and Powders will be maintained in local warehouse facilities to provide immediate deliveries against urgent spot shipment requirements.

W. V. Keegan

W. Keegan Heads Production Of A. C. Horn Plants

Mr. A. E. Horn, president of the A. C. Horn Company, Division of Sun Chemical Corporation, has announced the appointment of Mr. W. V. Keegan as vice president in charge of production of all A. C. Horn Company plants manufacturing paint, varnish and enamel. This includes the Horn plants located at Houston, Texas; Bell Gardens, California; San Francisco, California; Toronto, Canada; and Long Island City, New York.

Mr. Keegan, a graduate of Fordham and Rutgers University, is a chemist, patent attorney and member of New York State Bar. He has been associated with Sun Chemical since 1941 and became a member of the Horn Division in 1948.

According to Mr. Horn, Mr. Keegan has streamlined their system of paint manufacture, enabling each Horn plant to increase its volume and at the same time maintain a rigid control of quality.

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Raybo Chemical Co. Establishes Laboratory in Huntington, W. Va.

Raybo Chemical Company announces the establishment of its research and development laboratory at Huntington, West Virginia, where the firm's production is already carried on. Mr. Raymond Hepner, formerly with Baltimore Paint and Color Works, will be in charge of the activities at Huntington. Raybo's general offices remain at 1120 Chester Ave., Cleveland 14, Ohio.

Reichhold to Manufacture Resin Line in Israel

Arrangements have been concluded for the manufacture in Israel of a complete line of synthetic resins for the paint, paper, printing ink and plywood industries, Henry H. Reichhold, founder and Chairman of the Board of Reichhold Chemicals, Inc., announced.

Acquisition of manufacturing facilities for Reichhold products in Israel brings to 19 the number of foreign manufacturing affiliates of that company. The world's largest producer of synthetic resins, Reichhold has also nine plants in the United States and does an annual business of $100,000,000.

Financial and operational control of the new affiliate will remain in Israel, Mr. Reichhold said, but Reichhold engineers from the United States will go to Israel to impart the necessary American know-how to engineers there.

"Through this new affiliate," Mr. Reichhold added, "we expect to assist the Israeli economy by purchasing there such necessary raw materials for our Israel plant as petroleum products, glycerine and vegetable oils."

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Quentin Nelson Representing Jones-Dabney Company

Mr. J. M. Thomas, Sales Manager of the Resins and Chemicals Division of Jones-Dabney Company, a division of Devoe & Raynolds Company, announces the appointment of Mr. Quentin E. Nelson as sales representative in the southwest. Mr. Nelson will make his headquarters in Houston, Texas and will cover the states of Texas, Louisiana and Oklahoma.

NEWS DIGEST

L. M. Muse

D. S. Gaarder

Sherwin-Williams Announces Two Major Appointments

Two headquarters promotions in the General Industrial Division of The Sherwin-Williams Co. were announced recently by G. L. Hehl, General Manager of the division.

"The company's position in the industrial finishing market," Mr. Hehl said, "requires specialized attention to increase our service to American industry. The new appointments are designed to stimulate this specialized progress."

D. S. Gaarder, formerly assistant general manager, was appointed manager of the New Products Department of the General Industrial Division. In his new position Gaarder will direct the development and marketing of major new products.

"Gaarder's technical, organizational and field experience," Mr. Hehl said, "will give assurance of progress in this new and important industrial activity."

L. M. Muse, formerly assistant to the general manager, was appointed manager of the Branches Department of the General Industrial Division. His new duties involve the training of, and sales support to, branch and regional personnel.

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Stabilized Pigments Increases Iron Oxide Production

Added production facilities and new exclusive processing methods now enable Stabilized Pigments, Inc., Piscataway, New Jersey, to increase their output of pure red iron oxide from 80 to 200 tons per month.

The plant operation is unusual in efficiency for the entire processing procedure requires the services of only minimum personnel. The process is continuous, starting from an endless stockpile of raw iron sulphate by-product which is continuously fed automatically into the dryers. From there the calcining, washing, grinding, classifying and blending is automatic and the finished red oxide is bagged ready for shipment. The control points for careful tests at various stages of the processing guarantee the uniformity of product. No human hands are required other than to handle the push button controls.

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ADM Announces Winners of 1951 National Fish Derby

Champion fishermen of the paint, varnish and lacquer industries have been named by Archer-Daniels-Midland Company, sponsors of the 1951 national fish derby.

F. N. Redheffer, president of Great Western Paint Mfg. Co., Kansas City, Missouri, won the grand championship in Class One with a 5 pound 7 ounce Small Mouth Bass, caught August 18 in Sword Lake, Ontario.

Grand champion in Class Two is Warren Rosendall, Wolverine Finishes, Grand Rapids, Michigan. Rosendall landed a Lake Trout weighing 33 pounds 2 ounces on Lake Superior in August. He also won a best of specie award with a 7 pound 9 ounce Rainbow Trout.

A 5 pound 7 ounce Eastern Chain Pickerel earned the Class Three championship for J. Dippold of Flood and Conklin, Newark, New Jersey. The fish was hooked in Cedar Lake, New Jersey.

The three grand champions each received a Hydro-drive Champion outboard motor.

Contest judges were General Joseph E. Battley, president, National Paint, Varnish and Lacquer Association, Hugh Grey, editor of Field and Stream, and Dr. Samuel Eddy, professor of zoology at the University of Minnesota.

Jeffrey Stewart Promoted to GSA Paint Specification Post

After two years service with the Bureau of Yards and Docks, Dept. of Navy, Jeffrey R. Stewart has been promoted to the Federal Supply Service of the General Services Administration in Washington. Mr. Stewart will have charge of the coordination of all Federal Specifications which pertain to paint, varnish, lacquer and related products.

NPA Paint Industry Advisory Committee Meets on March 12th

Left to right around table — Floyd Lever, Alternate for J. D. Morton, Carpenter-Morton Company, Boston; M. J. Merkin, M. J. Merkin Paint Company, New York; D. H. Moran, The Reardon Company, St. Louis; Gordon Robertson, Acme Quality Paints, Inc., Detroit, A. B. Robertson, Sears, Roebuck & Co., Chicago; Carl Tudor, Jaegle Paint & Varnish Co., Philadelphia; W. W. Vasterling, Davis Paint Company, St. Louis; Milton R. Dallin, NPA Industry Committee Advisor; A. P. Mills, Chief, Protective Coatings Branch; Cazimier Cislo, Chemical Division, NPA; James Beckett, Interchemical Corp., New York; B. M. Belcher, Benjamin Moore & Co., New York; Paul Croll, Pittsburgh Plate Glass Co., Pittsburgh; Wm. C. Dabney, Devoe & Raynolds Co., Louisville; D. M. Gray, Stoner-Mudge, Inc., Pittsburgh; E. L. Gott, Gilman Paint & Varnish Co., Chattanooga; William E. Hood, Industrial Panit Mfg. Co., Birmingham; Robert Hughes, Red Hand Compositions, Inc., New York.

N. Y. Paint Club to Sponsor Copolymer Symposium

A Symposium on "Copolymers in Surface Coatings" will be given at the Polytechnic Institute of Brooklyn, April 9th at 7:15 P.M., under the sponsorship of the Educational Committee of the New York Paint & Varnish Production Club. The program includes a short paper on the theory of copolymers and three papers covering the use and application of copolymers in surface coatings. A general discussion of this timely subject will follow the presentation of the papers.

Program: Henry F. Payne, Chairman

7:15 — Definition and Theory of Copolymerization
J. W. McNabb, Kienle & Company

7:30 — Copolymerized Oils and Resins
J. H. Daniel, American Cyanamid Company

8:05 — Styrene and Styrene Copolymer Latices
W. C. Davis, Monsanto Chemical Company

8:30 — Vinyl Copolymers, Organosols and Plastisols
R. A. Calsibet, Carbide & Carbon Corporation

9:00 — General Discussion

Cabot Adds McNeil to Research Staff

William J. McNeil, a graduate of Worcester Polytechnic Institute, has joined the staff of Godfrey L. Cabot, Inc. Research and Development Department, as a chemical engineer in the Pigments Applications Group.

Schneible Opens Detroit Office

The Claude B. Schneible Company, Manufacturers of Dust Control Systems for Foundries, Metalworking and Process Industries announces the opening of new executive offices in Detroit at 212 Stephenson Building on the corner of West Grand Boulevard and Cass across from the General Motors Building.

NEWS DIGEST

Norbert E. Talbert

Falk Names Eastern Tech. Representative

Appointment of Mr. Norbert E. Talbert as a technical service representative of Falk & Company has been announced by Mr. Samuel Aronoff, vice-President in charge of eastern area sales.

Mr. Talbert has attended the Brooklyn Polytechnic Institute, Brooklyn, New York and his previous experience includes service with the Brooklyn Color Works, Brooklyn, New York and the Shepard Chemical Company, Cincinnati, Ohio.

Mr. Talbert is assuming his new duties immediately and will be calling upon the trade in the New York metropolitan area in the interest of all Falk products including Falkyd resins, linseed oils, soybean oils, fish oils and specialty products.

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ASTM Committee D-1 on Paints Reports on Activities

A Panel Discussion on Printing Ink featured the three-day meeting of Committee D-1 on Paint, Varnish, Lacquer, and Related Products during ASTM Committee Week, March 3-7 in Cleveland. In all, there were 75 meetings of D-1 subcommittee and working groups.

Printing Ink Properties

The Subcommittee on Printing Ink also received reports from its Working Groups on Definitions, Methods Review, Fineness of Grind, Rubproofness, Printing Ink Rheology, Drying Time, and Paper Ink Relations. Work is well advanced on the method for determining the fineness of grind. The Group on Rubproofness is studying four different machines for this test. Work will be started on the density and tinting strength of printing inks. A test for drying time is nearing completion.

Humidity

It was reported that a humidity test by means of water fog has been found satisfactory, and an effort will be made to standardize this. A test for blistering of organic coatings is also in preparation. This Subcommittee on Accelerated Tests has been carrying on experimental work on accelerated weathering machines.

Viscosity

A new proposed Tentative Method of Test for Viscosity of Paints, Varnishes, and Lacquers by the Ford Viscosity Cup has been approved, by vote of Committee D-1. This method, prepared in cooperation with the Federation of Paint and Varnish Clubs, will be issued as a joint method. A new test for resistance of a varnish film to immersion in sodium hydroxide solution also has been approved, and a test for determining nonvolatile matter in varnish is to be completed.

Aromatic Solvents and Lacquers

In cooperation with Committee D-16 on Industrial Aromatic Hydrocarbons, agreement has been reached on three specifications which cover respectively, 90 benzene, industrial grade toluene, and industrial grade xylene. Tests for color of clear liquids and a cold check test have been completed. Other matters under study include tests for household staining agents on lacquer finishes, also for gloss and viscosity.

Pigment Tests

A proposed test for common proper-

ties of certain pigments was submitted. Cooperative test work on procedures for the analysis of titanium pigments has been completed. The Test for Alkalinity or Acidity of Pigments (D-278) is to be withdrawn.

Solvent Tolerance

A new method of test for solvent tolerance has been approved. This is designed to measure the quantity of hydrocarbon solvent that an amine resin will tolerate at 25°C. Specifications for glycerin are in preparation. Round-robin tests are being made on the foil method for the determination of the non-volatile content of solutions of heat-insensitive resins.

Physical Properties

The Subcommittee on Physical Properties is considering the following methods of test: Oil Absorption of Pigments, Consistency of Pastes, Adhesion, Film Thickness, Hardness of Organic Films, Permeability, Fire Retardency, and Fineness of Grind.

The Manufacturing Chemist's Assotion Method for Flash Point Determinations of Liquids for Classification Under ICC Regulations by the Tag Open-Cup Apparatus is to be studied for possible approval.

Traffic Paints

The Subcommittee on Traffic Paint submitted two new methods covering crush resistance and sieve analysis of glass spheres used in traffic paints. Further work is under way on tests for clarity, chemical stability, and wetting characteristics of glass spheres.

Ferrous Surfaces

The Subcommittee on Painting of Materials reviewed a draft method of classifying ferrous surfaces for painting which will include a number of photographic standards representing different conditions of ferrous surfaces prior to painting. The specification will include a series of about 40 photographic reference standards showing (*a*) steel in a rust-free condition, (*b*) variations of rust attack on steel, and (*c*) surface conditions obtained by different types of cleaning and pretreatment.

Pigments — Tinting Strength and Color

New specifications for calcium carbonate pigments have been approved by committee vote and will be submitted to the ASTM Standards Committee. Also the test for mass color and tinting strength of color pigments (D 387) has been revised and reverted to tentative. Revisions in the specifications for venetian red (D 767) have been approved.

Volatile Solvents

The Subcommittee on Volatile Solvents submitted a proposed test for viscosity reduction power of hydrocarbon solvents. Revised specifications for mineral spirits developed jointly by this subcommittee and the Paint Production Clubs are to be circularized for information and comment. Work is being undertaken on a new method of test for determining evaporation rates of solvents and thinners.

Officers of Committee D-1 include chairman, W. T. Pearce, Consulting Engineer, Bala-Cynwyd, Pa. and Secretary, C. H. Rose, National Lead Co., Brooklyn 1, N. Y.

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H. Raich and J. Nesnow Join Nuodex Laboratories

Dr. Henry Raich and Julian Nesnow have recently joined the laboratories of Nuodex Products Co., Inc. of Elizabeth, N. J., makers of driers and other chemical additives. Dr. Raich is directing special projects under Milton Nowak, chief of the company's research and development laboratories. Mr. Nesnow is senior microbiologist in the microbiological laboratory, headed by Milton Goll.

Before coming to Nuodex, Dr. Raich did research work for the Mellon Institute of Industrial Research and the Los Alamos Scientific Laboratory. He received his Ph.D. at Rensselaer Polytechnic Institute. A member of the American Chemical Society and the American Institute of Physics, he is a resident of Elizabeth, N. J.

Mr. Nesnow was a microbiologist for the General Baking Company and for the Department of Health of Oklahoma. He is a graduate from Queens College and received his masters' degree at the University of Oklahoma. Mr. Nesnow lives in Jackson Heights, New York.

Ni-Hard, the nickel-chromium iron which has successfully demonstrated its resistance to abrasion in the milling of both metallic and non-metallic minerals, is now available at moderate cost to the Paint Industry in the form of grinding balls.

The high hardness and wear-resistance of Ni-Hard means longer service life in the grinding of pigments, hence higher production and ultimate economy.

Moreover, discoloration is minimized when Ni-Hard balls are used. Paint manufacturers have found that pastel pigments can be safely ground with Ni-Hard balls where previously flint pebbles had to be used to avoid discoloration which occurred with steel balls. Naturally also, the greater density of the metal ball makes a substantial contribution to mill efficiency as compared with the use of the lighter pebbles.

FIELD PROVEN SUPERIORITY:

1. On ¾" diameter balls grinding magnesium silicate in mineral oil, Ni-Hard showed an approximately 2 to 1 superiority over two types of high carbon steel as follows:

BALL MATERIAL	% WEIGHT LOSS IN 5,000 HOURS
Ni-Hard	5.52
Steel A	11.35
Steel B	12.95

2. A midwestern paint plant using ⅞" balls reported the following results:

BALL MATERIAL	WT. LOSS (LBS.) IN 2,500 HOURS
Ni-Hard	103
Steel	182–202

3. A Pennsylvania paint plant has used ⅞" Ni-Hard balls in regular grinding mill service for four years with excellent results both as regards economy and avoidance of discoloration problems.

Numerous paint manufacturers have now regularly adopted Ni-Hard balls. Interim reports indicate an increasingly wider acceptance of this efficient yet moderate priced modern grinding medium throughout the Paint Industry.

- Pennebacker Ni-Hard balls are available in four sizes: ⅝", ¾", ⅞" and 1" diameters.
- Delivery: Immediate, in bags or drums. All balls supplied in the *stress-relieved condition* to assure the maximum combination of abrasion-resistance and toughness.

THE PENNEBACKER COMPANY, EMMAUS, PA.

when the processing is done in open kettle equipment rather than a closed vessel. Likewise the use of inert gas and/or vacuum has very definite effects. The batch yield is also affected to some degree by the type of equipment used and the processing procedure as well as the polymerization temperature.

Comparison with other Oils

A DIRECT comparison of the polymerizing rate of safflower oil with that of linseed and soybean oil is made (Fig. 2). As one might expect from the iodine values of these oils, safflower bodies at a rate intermediate between linseed and soya. Again, however, the matter of average bodying rate versus instantaneous body rate becomes of interest. In the initial stages, before a viscosity of 1 poise is attained, safflower is much slower than linseed and is even a little slower than soya. In the case of soya this is contrary to what one would expect from the iodine values, but it is not too surprising when the component fatty acids of these two oils are considered (2, 6). In the intermediate stage safflower becomes considerably faster than soya but is still somewhat slower than linseed at the same temperature. It is very interesting to note that in the viscosity range of 10 to 50 poises the polymerization rate of safflower closely approaches that of linseed. This rate continues until a viscosity of at least 80 poises is attained. Polymerization studies beyond 80 poises (Z_4-Z_5) should be of considerable interest. Thus it is evident that with the aid of a 10° increase in polymerization temperature, safflower oil may be bodied to a viscosity of about 50 poises (Z_4-Z_5) in approximately the same time as linseed and hence the same average rate.

The iodine value versus viscosity curves for the oils are shown in Figure 3. The curves are quite similar in shape except that in the range of 20-60 poises the iodine value of safflower oil drops at a faster rate than either linseed or soya. It should be noted that the curve for safflower is a composite curve and includes data from cooks at three temperatures. The 595°F. data is indicated by a circle, the 585°F. by a dotted circle, and the 575°F. by a triangle. The plotted points indicate that the composite curve is a good mean curve for all three temperatures. The refractive index versus viscosity curves (Fig. 4) are again about what one would expect.

One of the outstanding properties of safflower oil is its ability to bleach under heat treatment. The final constants of the oils given in Table I show this quite clearly. It might be well to mention here that the bodied safflower dries at a rate equal to or slightly better than bodied linseed but under certain conditions retains a slight degree of "after-track" for a longer period of time.

Summary

It can be stated that the polymerization rate of safflower oil is sufficiently rapid to warrant its uses on a commercial scale. Furthermore, with the proper choice of polymerization temperature, safflower can be bodied at the same rate as linseed. The increasing rate at which safflower bodies in the high viscosity range invites further investigation. In these higher viscosity ranges the iodine value continues to drop whereas in the

same range the iodine numbers of other oils show a tendency to approach an asymptotic value.

Safflower heat bleaches considerably better than linseed and is also equal to or better than soya in this respect.

REFERENCES

1. Jamieson, G. F., "The Vegetable Fats and Oils," p. 297, New York, Reinhold, 1943.
2. Pugsley, A. T., and Winter, G., "Safflower: A Potential Oil Crop for Paint," Munitions Supply Laboratories, Rpt. 171, Commonwealth of Australia, 1947.
3. Bailey, A. E., "Industrial Oil and Fat Products," pp. 688-690, New York, Interscience, 1945.
4. Von Mikusch, J. D., Ind. Eng. Chem., 32, 1061-1069 (1940).
5. Shuey, R. C., *Ibid.*, 32, 921-930 (1940).
6. Mattiello, J. J., Vol. III, Ch. 4., New York, Wiley, 1943.
7. Sabin, A. R., "Safflower: A New Oilseed Crop," U. S. Department of Agriculture, 1950.

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NEW FRONTIERS

(*From Page 32*)

be stressed also that my personal enthusiasm for paper chromatography, far from being purely academic, is due rather to my own laboratory experience in working with it and to my continued amazement at its remarkable versatility in simplifying otherwise hopelessly complex analyses.

References

Kirby and Williams, Science, 107, 481 (1948)

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Glidden Promotes Armel To National Sales Mgr.

Appointment of Thomas N. Armel as National Industrial Sales Manager of the Glidden Company was announced by A. D. Duncan, vice president of the company's Paint and Varnish Division.

In his important new position, Mr. Armel will have headquarters direction of the development of all Glidden's industrial and maintenance finishes sales throughout the country. Prior to his appointment, he was in Chicago as a member of the sales force of the company's Nubian Industrial Division.

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Carlton Winslow Heads Cuno Engineering Sales

The Cuno Engineering Corporation, Meriden, Conn., elected Carlton H. Winslow Vice President in Charge of Sales. He was assistant general manager, and has been with the firm for 18 years.

PATENTS

Conducted by

Lancaster, Allwine & Rommel

PATENTS AND COPYRIGHTS

424 Bowen Building,
Washington, D. C.

Complete copies of any patents or trade-mark registration reported below may be obtained by sending 50c for each copy desired to Lancaster, Allwine & Rommel.

Drying Oils

U. S. Patent 2,581,094. Anthony H. Gleason, Westfield, and Stanley E. Jaros, Rahway, N. J., assignors to Standard Oil Development Company, a corporation of Delaware.

In a selective polymerization process for preparing drying oils wherein a conjugated diolefin having 4 to 6 carbon atoms per molecule is heated in the liquid phase in a reaction zone at a temperature between 50 and 150°C., under superatmospheric pressure and in the presence of a hydrocarbon soluble peroxide catalyst for a period sufficient to convert not more than 80% of the diolefin into a linear oily polymer and not more than 5% into a diolefin dimer, the method of reducing the formation of solid insoluble polymer which comprises continually flushing the entire interior surfaces of the gas space above the liquid level of the reaction zone with at least a portion of the liquid phase.

Flame-Resistant Polystyrene

U. S. Patent 2,582,452. Harry S. Olson and Robert C. Danison, Painesville, Ohio, assignors to Diamond Alkali Company, Cleveland, Ohio, a corporation of Delaware.

An organic, resinous, transparent, flame-resistant, thermoplastic composition consisting essentially of 72 parts of polystyrene, 27 parts of chlorinated paraffin wax containing 64% to 68% of chemically combined chlorine, and one part of glycidyl oleate.

Drying Oils

U. S. Patent 2,581,413. John C. Hillyer, Bartlesville, Okla., and James T. Edmonds, Sunflower, Kans., assignors to Phillips Petroleum Company, a corporation of Delaware.

A process for the condensation of an unsaturated glyceride oil with an aliphatic conjugated polyolefin to produce an improved drying oil, which comprises heating from 0.5 to 4.0 parts by weight of an unsaturated glyceride oil with one part by weight of such an aliphatic conjugated polyolefin having at least 4 and not more than 10 carbon atoms per molecule, under pressure sufficient to maintain a liquid phase, at a temperature within the limits of 200 to 350°F. and for a period of from 2 to 20 hours, whereby said polyolefin reacts with said unsaturated glyceride oil to form a condensate; removing unreacted aliphatic conjugated polyolefin and separately heating a resulting condensation product of said polyolefin and said oil at a temperature within the limits of from 350 to 600° F. for a period of from 1 to 10 hours, whereby the said condensation product is stabilized and bodied; and recovering stabilized condensation product as said improved drying oil.

Hydrocarbon Drying Oil

U. S. Patent 2,582,434. Alfred E. Hoffman, Clarendon Hills, and Herman S. Bloch, Chicago, Ill., assignors to Universal Oil Products Company, Chicago, Ill., a corporation of Dealware.

A process for producing a drying oil which comprises subjecting a non-aromatic unsaturated hydrocarbon of at least 3 carbon atoms per molecule to conjunct polymerization in the presence of a conjunct polymerization catalyst, continuing the reaction until there is formed a catalyst-hydrocarbon sludge comprising a complex addition product of the catalyst with polyolefinic cyclic hydrocarbons containing conjugated and non-conjugated unsaturation and boiling above and below 300° C., separating said sludge from the hydrocarbon products of the conjunct polymerization reaction, decomposing the separated

sludge to recover therefrom a mixture of said polyolefinic cyclic hydrocarbons, fractionating said mixture to separate therefrom polyolefinic cyclic hydrocarbons boiling below about 300° C., supplying the latter to the conjunct polymerization step for further conversion therein to higher molecular weight hydrocarbons and reaction with conjunct polymerization catalyst as aforesaid, and recovering the remainder of said mixture as the drying oil product of the process.

Cement Coatings

U. S. Patent 2,583,985. Steven B. Avery, East Orange, N. J.

A cementitious coating material produced by hydrating a mixture comprising cement of the Portland type and stannous chloride, the ratio of stannous chloride to cement being in the order of four parts by weight of stannous chloride to sixty-five parts by weight of cement, and exposing the mixture to the atmosphere, whereby the stannous chloride is converted to water-insoluble stannous oxychloride, which substantially fills the pores and voids of the cement.

Antifouling Marine Paint

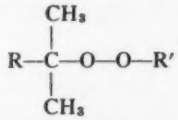
U. S. Patent 2,583,545. John S. Cameron, Compton, Calif., assignor of one-half to Morton E. Feiler, Los Angeles, Calif.

An anti-fouling marine paint adapted for application to the hulls of vessels comprising a pigment including finely divided metallic copper, finely divided metallic zinc and cuprous oxide thoroughly dispersed through and suspended in a vehicle-binder including chlorinated coal tar pitch, the finely divided metallic particles of copper and zinc being insulated one from the other by said pitch to form in the main coating film a multiplicity of primary cells which, in contact with sea water and in the acid environment afforded by the acid nature of said chlorinated coal tar pitch, sets up in the said main coating film a voltaic current effective to repel marine animal growth from said main coating film, said pigment ingredients combining with the long-chain acids of said vehicle-binder to form continuously a primary soap-film loosely attached to said main film, the primary soap-film being likewise charged with voltaic current to repel marine animal growth and being capable of sloughing off from said main film when said vessel is in motion, thus to carry away any marine vegetable growth accumulating on said primary film when the vessel is not in motion.

Drying Oils from Diolefins

U. S. Patent 2,586,594. Erving Arundale, Anthony H. Gleason, and Fred W. Banes, Westfield, N. J., assignors to Standard Oil Development Company, a corporation of Delaware.

In a selective polymerization process for preparing drying oils the improvement which consists essentially of the steps of heating a conjugated diolefin of 4 to 6 carbon atoms at a temperature between 50 and 150°C., under a pressure ranging from 3 to 30 atmospheres and in the presence of 1 to 3 mol percent per mol of monomer of a hydrocarbon soluble catalyst having the formula



wherein R is a member selected from the group consisting of methyl and phenyl and R′ is a member selected from the group consisting of hydrogen and benzoyl, for a period sufficient to convert a major proportion but not more than 80% of the diolefin into a linear oily polymer having a molecular weight between 1000 and 20,000.

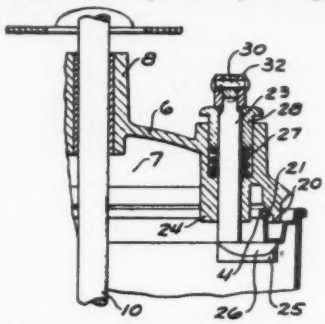
Styrene-Olefin Wax Compositions

U. S. Patent 2,580,050. William J. Sparks, Cranford, and Paul E. Hardy, Elizabeth, N. J., assignors to Standard Oil Development Company, a corporation of Delaware.

An article comprising a self-sustaining film consisting essentially of 2% to 10% by weight of a microcrystalline petroleum wax and the remainder a copolymer of a styrene and isobutylene, said copolymer having an intrinsic viscosity in the range of approximately 0.6 to 3.0 and containing about 50% to 60% by weight of combined styrene.

Closure for Paint Cans

U. S. Patent 2,585,334. Myron D. McCauley, Huntington Woods, Mich., assignor to Rinshed-Mason Company, Detroit, Mich., a corporation of Michigan.



In a device applicable to a sheet metal container for paint or the like wherein the container has, at one end thereof, an inwardly extending flange like portion, with the flange like portion having a chimb which defines an opening, a closure body having a circumferential seat for seating on the chimb, a plurality of journal formations on the closure body for receiving a fastening device, each fastening device having a pintle member slidably and rotatably positioned in a journal formation, a projection on the inner end of the pintle which is engageable under the flange like portion of the container, a spring in the journal formation surrounding the pintle, said spring seating on the closure body, a bushing slidably positioned in the journal formation and acted upon by the spring, and a cam lever having an end portion pivotally mounted eccentrically to the outer end of the pintle with the cam portion thereof in engagement with the bushing, said cam lever being operable to tighten the projection on the pintle in engagement with the flange like portion with resultant compression of the spring, and operable to relieve the compression of the spring so that the pintle may be turned to disengage the projection from under the flange like portion, said spring extending to maintain the pintle under axial load when the projection thereof is released from the flange like portion of the container.

AMINO RESINS

(*From Page 23*)

55% of oil, and long as 55% or more of oil.

For example, melamine resin A under Type 1 is compatible only with alkyds of short to medium oil length and is not compatible in *all* proportions with long oil alkyds. This column does not take into account any partial compatibilities which may occur with individual alkyds of oil-length outside the limits mentioned.

In general, resins showing low formaldehyde may also be assumed to be low in alkoxy content, although there are some exceptions. Similarly, these showing high formaldehyde usually will be fairly high in alkoxy content with few exceptions. (See Figure 10).

The following points have been discussed:

1. Individual components used in preparation of amino resins.
2. Factors, aside from components, controlling final properties of the resins.
3. General methods of manufacture of amino resins for coatings.
4. Some thoughts on curing mechanism of amino resins, when cured alone.
5. Some thoughts on curing of amino resins in presence of alkyd resins.
6. Commercial types of amino resins.
7. Expected behaviour, in a very general sense, of amino resins of various types with alkyd resins in baked enamel films.

REFERENCES

1. Ellis — Chemistry of Synthetic Resins, Chapters 26 and 27 — Reinhold Publishing Company (1935)
2. Dittmar & Strain — USP 2,321,544
3. Hodgins & Hovey — USP 2,221,708
4. Tawney — USP 2,328,265
5. Ripper — USP RE-19463
6. Morgan — USP 2,174,012
7. Edgar & Robinson — USP 2,191,957
8. Gams, Widmer & Fisch — Helv. Chin. Acta *24* 302E-319E (1941)
9. Auten — Resinous Reporter 8, No. 3, May 1947 — Ibid No. 4, July 1947
10. Thurmond — Official Digest, Federation of Paint and Varnish Production Clubs, May, 1950, 381-388
11. Marvel, Elliot, Boettner & Vuska — J. Am. Chem. Sec. 68, 1681-6 (1946)
12. Parker — Official Digest, Federation of Paint and Varnish Production Clubs, April 1951, 237-244
13. Parker & Hahn — Unpublished

CALENDAR OF EVENTS

April 3-5. First Pacific Coast Paint Material and Equipment Exhibit, Biltmore Hotel, Los Angeles, Calif.
April 28-30. Spring Meeting of American Oil Chemists Society, Shamrock Hotel, Houston, Tex.
May 2-3. Joint Meeting of Dallas-Houston Paint and Varnish Production Club, Stoneleigh Hotel, Dallas, Tex.
May 23-24. Spring Symposium of Pacific Northwest Paint and Varnish Production Club, New Washington Hotel, Seattle, Wash.
June 23-27. ASTM Annual Meeting, Hotel Statler, New York.
Oct. 8-10. American Tung Oil Ass'n. Annual Meeting, Admiral Semmes Hotel, Mobile, Ala.
Nov. 17-19. National Paint, Varnish and Lacquer Ass'n. Annual Convention, Palmer House, Chicago, Ill.
Nov. 20-22. Federation of Paint and Varnish Production Clubs Annual Meeting, Palmer House, Chicago, Ill.
Nov. 18-22. Paint Industries' Show, Palmer House, Chicago, Ill.

Production Club Meetings

Baltimore, 2nd Friday, Belvedere Hotel.
Chicago, 1st Monday, Furniture Mart.
C.D.I.C., 2nd Monday.
Cincinnati — Oct., Dec., Mar., May, Cincinnati Club;
Dayton — Nov., Feb., April, Van Cleve Hotel;
Indianapolis — Sept., Claypool Hotel;
Columbus — Jan., June, Fort Hayes Hotel.
Cleveland, 3rd Friday, Harvey Restaurant.
Dallas, 2nd Thursday, No Fixed Place.
Detroit, 4th Tuesday, Rackham Building.
Golden Gate, Last Monday, El Jardin Restaurant, San Francisco.
Houston, 2nd Tuesday, Seven Seas Restaurant.
Kansas City, 2nd Thursday, Pickwick Hotel.
Los Angeles, 2nd Wednesday, Scully's Cafe.
Louisville, 3rd Wednesday, Seelbach Hotel.
Montreal, 1st Wednesday, Queen's Hotel.
New England, 3rd Thursday, Puritan Hotel, Boston.
New York, 1st Thursday, Building Trades Employers Assn.
Northwestern, 1st Friday, St. Paul Town and Country Club.
Pacific Northwest, Annual Meetings Only.
Philadelphia, 3rd Wednesday, Engineer's Club.
Pittsburgh, 1st Monday, Fort Pitt Hotel.
St. Louis, 2nd Tuesday, Forest Park Hotel.
Southern, Annual Meetings Only.
Toronto, 3rd Monday, Diana Sweets, Ltd.
Western New York, 1st Monday, 40-8 Club, Buffalo.

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MULTI-WASH

There's no need to tolerate the nuisance of paint, varnish or lacquer fumes, odors and dusts. Years of *on-the-job* operation under all kinds of conditions, have proven that the Schneible Multi-Wash System is the *most efficient method* of controlling this common nuisance. Special tests performed for the industry also bears out this statement.

Not only does the Multi-Wash give top efficiency in removing toxic air so harmful to the employees' health, but it recovers valuable volatile oils and solvents for reprocessing or reuse, thus saving its cost many times over.

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Write for bulletin No. 551 covering information relative to paint, varnish, lacquer and printing ink applications.

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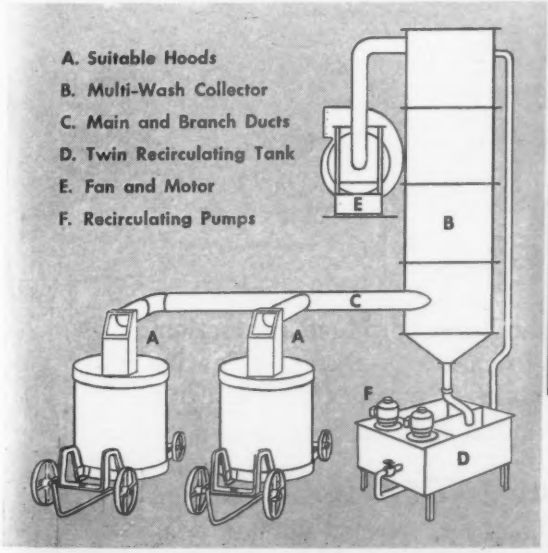
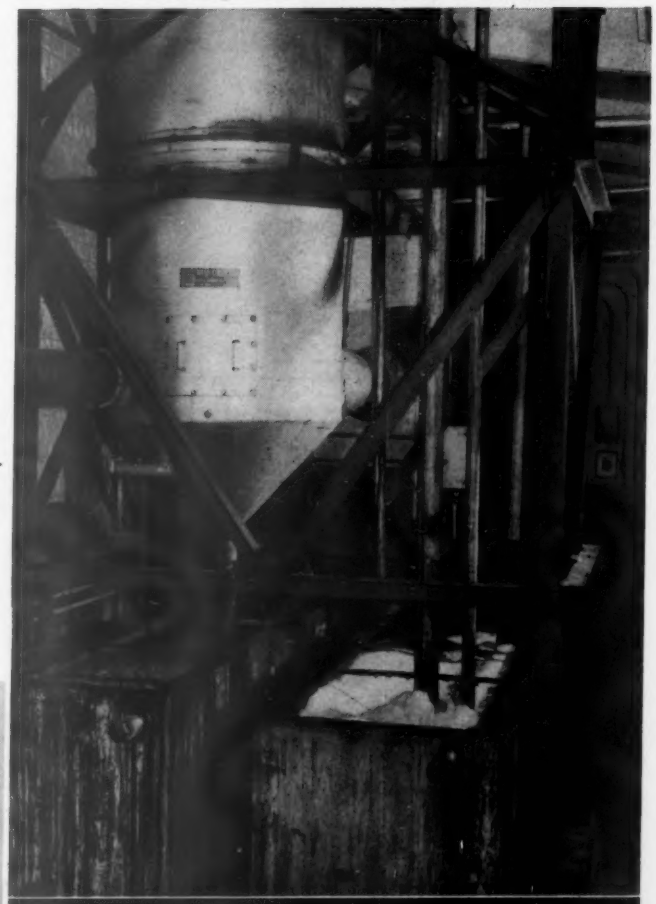


Pair of Multi-Wash Collectors handling 6 cooking kettles. Note that there is a separate inlet from each kettle hood to Collector to eliminate fire flashing back from one kettle to another.



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abstracts

Styrenated Resins and Oils

Bevan, E. A. Peintures, Pigments, Vernis, 26 (1950), 305-308.

The copolymerization of styrene with numerous components produces final products exhibiting properties similar to those of polystyrene such as rapid drying, high resistance to water chemicals, considerable hardness of the films produced and high electric resistance.

Bevan shows that the mixed polymerization of styrene with drying oils lead to similar products of improved properties, although bonding of the styrene to the unsaturated oil centres retards the process of oxidation and the corresponding rate of film hardening. These disadvantages are not very appreciable in baking processes, however. Oil-modified alkyd resins can also be modified by copolymerization with styrene in a similar manner as fatty oils, although increasing the styrene content induce decreasing solvent resistance and gloss stability. Two methods can be applied for the production of homogeneous mixed polymers of styrene and drying oils. One of these is based on partially polymerized oils or on mixed esters (alkyds, etc.) produced from them, while the other method uses non-polymerized oils and so called "control substances" such as phenyl compounds, sulphur and, chief of all, a-methyl-styrene. The first (British) method and the latter (American) process can be conducted with or without the addition of solvents. In the case of the British method the oil constituent must exhibit a certain definite degree of polymerization. It has not been possible as yet to completely clear up the mechanism of reaction of styrene with fatty oils.

Phenolic Resin Chemistry

Hultvsch, K., Anwewandte Chemie, 1951, 63, 168-171.

Hardening of phenol alcohols can be effected merely by the addition of strong acids in the cold, leading to the formation of methylene bridges. This hardening process proceeds much more uniform than resinification by thermic methods. Different conditions prevail in the production of moulded plastics where hardening of phenol resins is frequently effected by heating with hexamethylene tetramine. It is supposed that hardening in this case is due to the formation of bridge compounds containing nitrogen. The formation of resols commences with the formation of additive compounds of formaldehyde and phenols in the presence of alkalies, leading to the production of phenol alcohols containing one or more methylol groups tending to etherify one another or to join the individual phenol nuclei. Ammonia resols are a product of reaction between phenol and hexamethylene tetramine produced by ammonia and formaldehyde. The condensation of phenol alcohols with unsaturated substances — such as fatty oils — is termed oil-reactivity. The production of different types of phenol resins is rendered possible by the loss stability of the benzol nucleus by the phenolic hydroxyl group. It extends

not only to the ortho- and para-permanent hydrogen atoms but also to the bridge combinations and the reactive groups. The progress of the formation of phenol resin is governed by the coordinating combining forces of the oxygen and nitrogen atoms as well as the formation of the hydrogen bridges. The water content of the resols are most reliably determined by measuring the water vapor pressure, while the hydrogen bromide saponification and the determination of the bromine value are used to determine the ether bridges.

Chroman Formation from Methylol Phenols and Oleic Acid

Sprengling, G. R., Westinghouse Research Laboratories. Presented at the Elastomers and Plastomers Section, XII International Congress, Sept. 11, 1951.

Previous work has shown that the formation of chroman rings occurs as a major reaction when a blocked phenol, such as 4-tert. butyl-2-methyl-6-hydroxy-methyl phenol, is heated with oleic acid. This reaction may be regarded formally as a Diels-Alder reaction of a quinone methide monomer transiently formed from the methylol phenol on heating. It is accompanied in blocked phenols by a self-condensation of the methylol phenol apparently also proceeding by way of the quinone methide stage but not involving the oleic acid. When methylol phenols with free, reactive ring positions are used chroman formation still takes place, but it is here accompanied by a second type of self-condensation of the methylol phenol leading to formation of diphenyl methanes. The formation of chroman rings each involving a molecule of oleic acid and one of methylol phenol takes place in competition with these two types of side reaction. The amount of acid bound to higher molecular weight complexes may be taken as a measure of the formation of such chroman rings. A study has been carried out with a series of simple methylol phenols and resin intermediates to determine how the formation of such chroman rings is influenced by varying substitution on the phenol ring.

Effect of Temperature of Film-Forming Substances

Held, F. Presented before the 1951 General Meeting of the Society of German Chemists.

The physical properties of high-molecular thermoplastic synthetics are characterized by the determination of (1) the permissible boundary temperatures if the substances are to be resistant to mechanical and dielectric stresses, (2) the determination of the freezing points at which parts of the molecule chains can change places, and (3) of the melting points where the chains as a whole may change places (macro-or micro-Brown's movement). It is governed by the constitution, the shape and the specific arrangement of the string molecules.

New Inorganic Pigments

Korinth, E. Presented before the 1951 General Meeting of the Society of German Chemists.

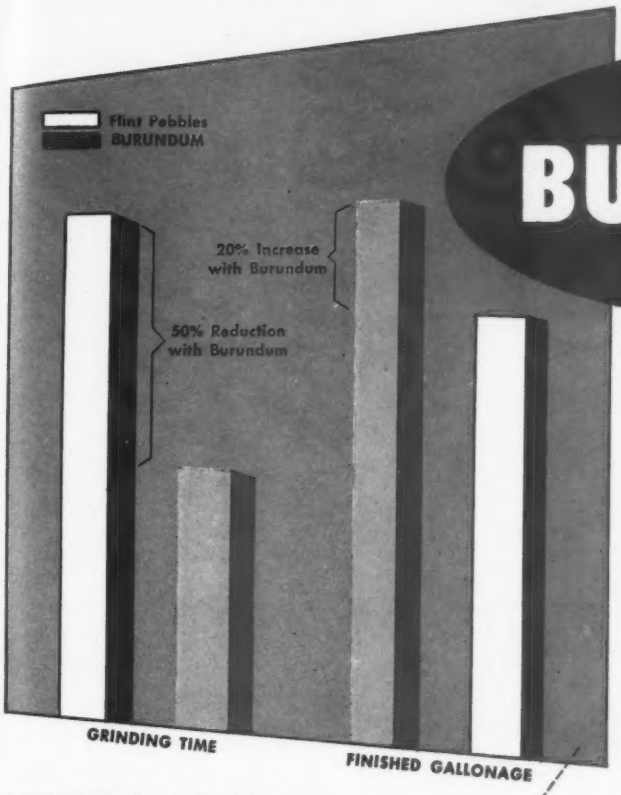
The author reported on the development of a number of new pigments obtained by calcining the so-called "Grimm's mixed crystals" consisting of $KMnO_4/BaSO_4$ in presence of barium nitrate. The product obtained represents pigments resistant to cement, concrete, etc. Other research work included the development of anti-rusting paints with a view to economizing on the use of lead. It was found that lead cyanamide represents a highly effective and economical antirusting pigment. It appears, however, that a lengthy discussion of this subject did not clear up all doubtful points relative to the production processes and the application of these new materials.

Lecithin in Paints

Fontaine, Petit, and Bagot. Bull. Iterg 4 (1950), 5-10.

The authors determined that vegetable lecithin improves the wetting capacity of the pigments. If 0.5 parts of lecithin are added to a mixture of 45 parts of zinc oxide, 38.5 parts of heavy spar and 11 parts of linseed oil, a light fluid homogenous mixture is produced. The same influence is exerted on gas carbon black, ochre, etc. The quantity of lecithin added for this purpose should just suffice to form a mono-molecular layer of the pigment surface. Grinding and mixing of pigments are accelerated, the quantities of oil reduced etc., while the gloss of the resulting paint films is considerably improved.

TO GET MORE *OUT* OF YOUR MILLS



PUT BURUNDUM IN!

No matter how you figure it — you get more out of your mills when you put Burundum in!

Here's Why . . .

Burundum gives you the same grind in less than half the time.

Burundum gives you a much finer grind in the same time.

Burundum gives you equivalent grinds at much higher batch consistencies.

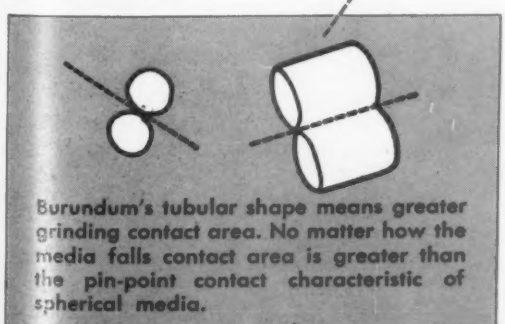
FIELD REPORT NO. 54:
A large paint manufacturer used 1000 pounds of Burundum in each of two 3′ x 3′ Buhrstone lined mills. Certain batches which they formerly ground in 48 hours with flint pebbles were produced in 24 hours with Burundum. On other batches they were able to increase consistency to yield a 20% larger batch and still obtain a satisfactory grind in 18-24 hours with Burundum.

Here's How . . .

Burundum's exclusive cylindrical shape gives the maximum area of attrition — the greatest work per contact.

Burundum's high specific gravity — the highest of any non-metallic medium — gives you faster action, higher permissible mill speeds — more contacts per minute.

Burundum's extreme hardness — approaching that of diamond — gives you longer wear, positive grinding — more efficiency per contact.



Burundum's tubular shape means greater grinding contact area. No matter how the media falls contact area is greater than the pin-point contact characteristic of spherical media.

What's More . . .

Burundum is smooth and non-porous for easy cleaning.

Burundum is white and slow wearing for minimum contamination.

Burundum is virtually inert for maximum chemical resistance.

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Get full technical information, case histories, prices on Burundum.

Ask for Bulletin B-20.

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AKRON 9, OHIO

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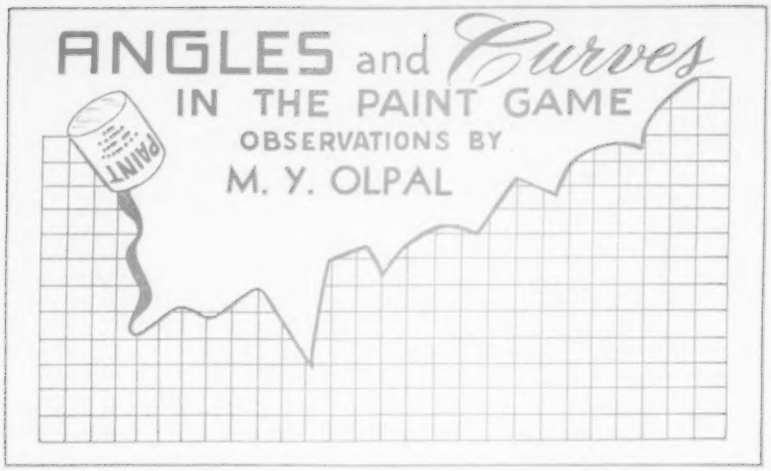

Jane stopped chewing gum for a minute. I could guess she was enjoying the moving picture show going on inside her head rather than taking in the hubbub of the office. For my part, I rather approvingly surveyed the irregular expanses of a white organdy sweater. Yes, we were both daydreaming.

The boss' door opened and closed and out came a guy like a pelican. He wasn't holding it all in his beak but the load of books he carried almost staggered him.

"He sure is stacked," Jane remarked.

"Yes, I told her. He's stacked — not like you Janie, but he's padded with one of the bosses red hot ideas."

"What's this one about?"

"Well," I ventured, "a nurse might call it 'easing the pains of indirect labor'."

I immediately saw a wall of injured silence forming for the rest of the afternoon, so I started explaining the meaning of indirect to her.

"High labor costs are not limited to direct labor like paint grinding, filling, weighing, labelling and all the other buggy-lugging we pay labor for in this plant. Not at all. High labor costs carry over into transportation costs and this means increased freight rates."

"So what's new about this? Does it make me Santa Claus?" Jane taunted.

"You see, the increase in freight rates over the last twelve years make a terrific change in the economic picture of our paint industry. According to the freight rates we now have to pay, it's cheaper to make a few shipments of large quantities of raw materials than it is to ship many unit quantities of finished paints."

Jane still didn't see where the ball I was throwing was going to land, but I continued.

"This means to the paint manufacturer, that incoming shipments can be handled by rail OK, but outgoing shipments can best be handled by trucks. You know how fast truck drivers can get down to handling things, don't you Janie?"

I looked at her to see if she got the point.

"But the rail-in, truck-out set up makes supersize paint plants impossible. The way is clear for large and economical plants to operate at various diversified places where population is concentrated."

"Maybe," Jane said, "but we had a dead duck in here yesterday waiting for our P.A. He said it might be a good idea to make paint at a central point of manufacture and ship carloads of paint to warehouses. Then truck from there to the stores."

"I'll chew that one up," I told her. "That's good reasoning in the case of trade sale items. You're partly right. But where you really want to handle industrial finishes the time lag between order and delivery is too short for transshipment and warehousing. Industrial shipments and industrial servicing require direct contact. And as far as two shipments plus warehouse charges and a big inventory piled up, where do you think trade sales costs would be? In indirect labor again."

"So why should Mr. Pelican lug all those books to and from the bosses office?" Jane said poutingly.

"He's probably getting data on new and expanding centers of population."

"Oh," said Jane. "I've heard of investigations of the centers of population before."

After this remark I didn't know what to say to give her the idea that there would likely be a controlled diversification of paint production centers throughout the nation due to rapid shifts of masses of population and increasing transportation costs between centers. Such is education in the facts of business life.

New Book

Vinyl and Related Polymers

By Calvin E. Schildknecht. Published by John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y. Price — $12.50.

Emphasizing the experimental, practical, and commercial aspects of the subject, "Vinyl and Related Polymers" by Calvin E. Schildknecht was published in February by John Wiley & Sons.

Dr. Schildknecht's study concentrates on the preparation, properties, and applications of vinyl and related polymers in rubbers, plastics, and fibers, as well as in the medical and industrial arts. The practical chemistry and physics of polymerization and polymers, the basic inventions, the methods of synthesis, and the advantages and limitations of the products, receive emphasis throughout the new volume.

Stressing the practical rather than the theoretical and mathematical aspects, Dr. Schildknecht gives special attention to the most recent developments in the subject. These include styrene copolymers, vinyl chloride copolymers, acrylic fibers and plastics, fluoropolymers, polyethylene, nitrogen-vinyl polymers, and polymers prepared by ionic reactions at low temperature. More than 4,000 literature references from 1835 to the second half of 1951, and the trade names for hundreds of European and American products have been incorporated to bring the book thoroughly up to date.

The author, now with the Celanese Corporation of America at Summit, New Jersey, was formerly with the du Pont Company and the General Aniline and Film Corporation. His new book reflects the fifteen years in research and development of vinyl products during which he has contributed to the current knowledge of acrylic monomers, vinyl ethers, nitrogen-vinyl compounds, and the relationships of polymer properties to molecular structure.

NEWS DIGEST

J. M. Thomas

J. M. Thomas Promoted to Sales Mgr. of Jones-Dabney

Mr. J. C. Knochel, Vice President of the Resins and Chemicals Division of Jones-Dabney Company, a division of Devoe & Raynolds Company, announces the appointment of Mr. J. M. Thomas as Sales Manager of that division.

A graduate of De Pauw University, Mr. Thomas has been associated with the Jones-Dabney Company for the past fifteen years. Originally employed as a laboratory assistant in the enamel production department, he was soon thereafter placed in charge of the varnish development laboratory. In 1945 he became Technical Director of the Resins and Chemicals Division and four years later was appointed Assistant Sales Manager in that same division.

He is a member of the American Chemical Society, the American Society for Testing Materials (A. S. T. M.) and is also active in the affairs of the Louisville Paint Production Club and the Louisville Paint, Varnish and Lacquer Association.

Du Pont Pigment Appointments

Dr. Jack B. Callaway has been appointed manager of west coast sales for the Pigments Department of the Du Pont Company. His headquarters are in Los Angeles, Calif. He succeeds Robert P. Enslin, who died last year.

M. James McLain, formerly a pigments salesman at Cleveland for the central area, succeeds Dr. Callaway as sales promotion manager for dry colors in the Wilmington headquarters of the company. Leland F. Andrews succeeds Mr. McLain, with headquarters in Cincinnati.

BOYSEN PLANT

(*From Page 33*)

rooms and the advertising department. The entire second floor now consists of offices. Each of the offices is painted a different shade; green, yellow, brown, rose, etc. Special care was given to the color planning of the entrance lobby, which is finished in grays and emerald greens with a modern classic design wallpaper mostly in greens over several panels.

Showpiece of the new office building is of course, Mr. Boysen's private office. This large sunny room is panelled in mahogany, grayed down by bleaching. The gray carpet is laid over a foam rubber pad. Drapes are handblocked with a pine bough design in pine green on a gray background. The walnut furniture is upholstered in leather in green and morocco red. One end of the room is graced by a beautiful marble fireplace with brass andirons and screen. Opening off this room is an alcove finished in handblocked wallpaper of Chinese design. In keeping with the paper is a teakwood table and heavy chinese brass opium bowl.

Mr. Boysen contributes his ever increasing paint business to the highest quality paints at competitive prices, service, advertising, good merchandising and the enthusiasm displayed by the representatives of the Boysen Co.

TECHNICAL Bulletins

PIPING

Book is a collection of data and technical information about piping. The aim of the authors is to bring the material from many sources into one volume. Many tables and diagrams are used to simplify finding the factor and data necessary for all sorts of piping work. Code requirements and design factors are covered. Velocity, pressure drop, and heat transfer are dealt with next. This book entitled "Piping Design and Engineering" may be obtained from the Grinnell Co., Providence, R. I. Remit $10.

MILL SELECTION

Collection of engineering data on rod, pebble, and ball mills is contained in 44-page bulletin. This bulletin gives points to consider when choosing a grinding mill, gives basic design of different types of mills, and describes grinding circuits. Allis-Chalmers Manufacturing Co., 1151 S. 70th St., Milwaukee, Wis.

Paisley

LABELING

Revised 8 page illustrated technical service bulletin titled "Round Container Labeling" has been published by Paisley Products, Inc., of New York and Chicago. Sections in the bulletin deal with food container labeling, chemical product container labeling, government specification container labeling, and a description of labeling methods, spot labeling and wrap-around labeling. Illustrated are all the current machines used for automatic or semi-automatic operation of labeling lines, suitable for glass jars, bottles, tin cans and fiber bodied cans. A selected list of the most popular Paisley labeling adhesives for this equipment and labeling methods is also included.

Paisley Round Container Labeling Bulletin is available on request by addressing Paisley Products, Inc., 1770 Canalport Avenue, Chicago 16, Illinois, or 630 West 51st Street, New York 19, New York. The Bulletin is also available from the Paisley sales offices located in principal cities throughout the country.

HIGH SPEED MIXING

Four-page folder describes high speed mixing by centrifuge method. Advantages of the high speed mixer are listed together with various industrial applications; among them discussed are dispersion and mixing of ingredients employed in water-base paints. Entoleter Div., Safety Car Heating and Lighting Co., Inc., P.O. Box 904, New Haven 4, Conn.

VINYL SOLUTIONS

A free four-page folder on vinyl acetate polymers and copolymers in solution and emulsion form is now available from National Adhesives Division of National Starch Products, Inc., 270 Madison Avenue, New York City 16. To illustrate some of the variations in properties which National has been able to obtain with polyvinyl acetate and its copolymers, the folder lists properties of five typical solutions and five typical emulsions.

A table of solution properties includes solids content, viscosity, film hardness, and intrinsic viscosity A table of emulsion properties gives solids content, pH, particle size, solvent tolerance, and freeze-thaw stability.

The booklet also discusses compatibility of the solutions and emulsions with modifiers, the use of plasticizers, and potential applications of the resins.

Resin examples described in the booklet are intended only as illustrations of how the materials can be adapted to the user's needs. National is prepared to tailor resin to the requirements of the individual user.

GEON DATA

Sixteen page bulletin contains recent technical data on compounding "Geon 101" and "101-EP", straight polyvinyl chloride resins. B. F. Goodrich Chemical Co., Rose Bldg., Cleveland, Ohio.

RESIN DATA

Plastics and Resins Div., American Cyanamid Co., 30 Rockefeller Plaza, New York, N. Y. has recently published technical data sheets illustrating the use of its resins for certain federal and military specifications.

MIXERS

Bulletins 510 presents a series of portable mixers offered by Eastern Industries, Inc., Norwalk, Conn. A discussion of important factors which determine the choice of mixing equipment for a specific problem is offered as a guide to the plant engineers for preliminary planning.

BURUNDUM

The U. S. Stoneware Co., has just issued a new Bulletin on Burundum "The Tubular Grinding Medium." This bulletin gives the physical properties of Burundum as well as comparison data with other grinding material. This bulletin shows the advantages in using Burundum and gives the results of numerous field tests.

This 4 page, 2 color bulletin B20, is free on request. Replies should be addressed to: U. S. Stoneware Co., Akron, Ohio.

BLENDING SYSTEMS

New 12-page folders describes construction, operation, flexibility and wide application of system for accurately blending two or more liquids in increments as low as 1/20%. Sketches show simplicity and compactness as well as various types of installations. Bowser, Inc., 1377 Creighton Ave., Fort Wayne 2, Indiana.

STAIN-FILLER FORMULATOR

Small, well established industrial wood coating manufacturer has need for a stain and filler formulator. We desire someone who has a thorough knowledge of color pigments, formulations of pigment oil wiping stains, NGR stains, wood paste fillers, and combination stain/filler products. State age, education and practical background. Detail regarding duties and compensation will be discussed during personal interview held at our expense. Replies handled in utmost confidence. Address direct to Max A. Fritz, Vice President, Robertson Company, Inc., 1315 W. Kentucky Street, Louisville, Kentucky.

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AZO ZZZ-22

A high oil absorption Zinc Oxide having large Acicular Particles which gives heavy body

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AZO ZZZ-11

A medium oil absorption Acicular Zinc Oxide imparting exceptional weathering qualities to exterior paints

AZO acicular lead-free zinc oxide is a superior pigment available in a wide range of oil absorptions

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A definitely Acicular type with a lower oil absorption, but chemically identical with AZO ZZZ-11 and AZO ZZZ-22

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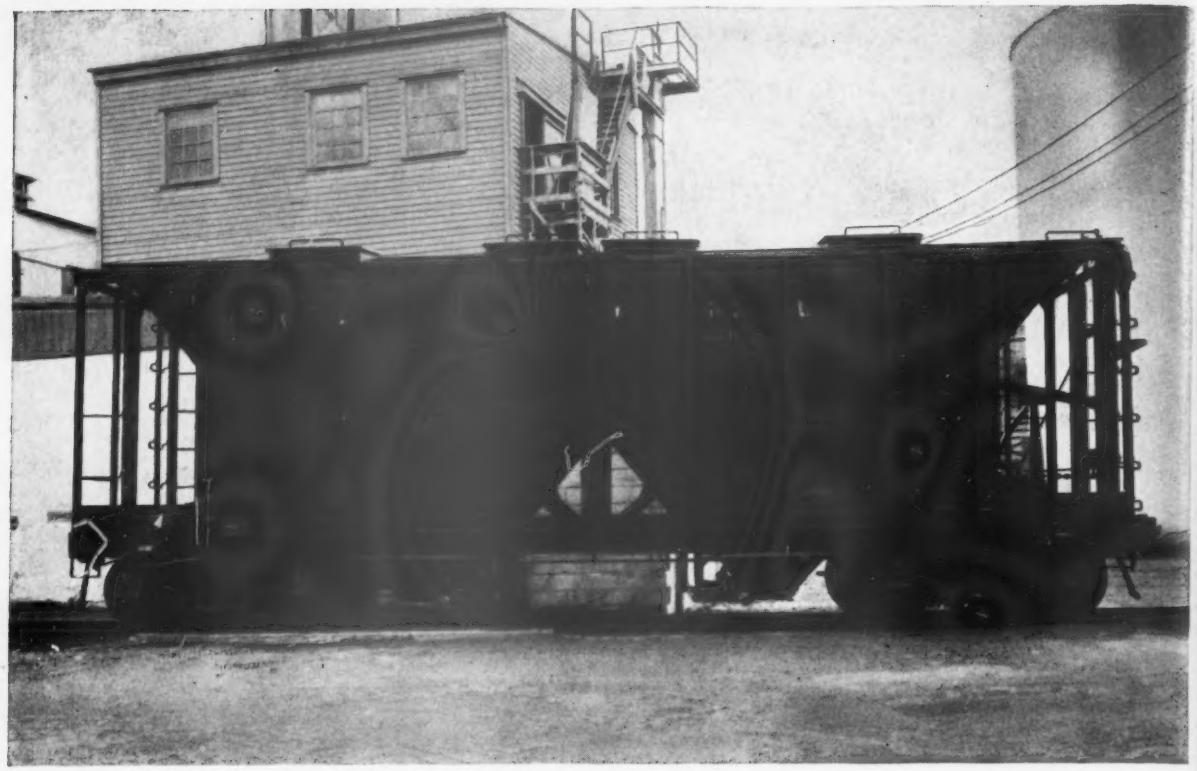

This car can bring you NEW MARKETS

Data courtesy The Glidden Company, Cleveland, Ohio.

For fifteen months, this hopper car has been hauling corrosive soda ash—a substance that makes a steady diet of car coatings.

The stenciling, done with ordinary enamel, disappeared long ago. But the paint covering the car is still there with *months* of service to come. Beating the car with hammers to loosen the load broke the surface in spots. But the coating stuck firm around them, preventing rust creepage.

Your paints, too, will give service like this—if they're based on VINYLITE Brand Resins. Railroads, factories, public buildings, oil refineries—even water tanks and food containers—are outstanding examples of the market for such protection!

Easily formulated, coatings based on VINYLITE Resins resist oil, water, corrosive atmospheres, most chemicals. Properly applied on metal, concrete, or masonry, they're quick-drying, non-flammable, odorless, tasteless, and non-toxic, protecting contents from containers and containers from their contents. With a wide range of colors – flat, semi-luster, or glossy—they are unchanged by repeated scrubbing and washing.

Easy to compound with standard equipment, these coatings compare favorably in cost. Formulate your paints with VINYLITE Brand Resins. They are lending their unique qualities to scores of products in defense and basic industry. We'll help you with technical data. Write Dept. MK-75.

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